REPORT

OF THE

TUBERCULOSIS COMMISSION

OF THE

STATE OF MARYLAND

1902-1904

1904
THE SUN JOB PRINTING OFFICE
BALTIMORE

REPORT

OF THE

Tuberculosis Commission

OF THE

STATE OF MARYLAND

1902-1904

STATE TUBERCULOSIS COMMISSION OF MARYLAND,

1902-1904.

Dr. Wm. S. Thayer, *President.*

George Stewart Brown.

Dr. W. Frank Hines.

Dr. Lillian Welsh.

John M. Glenn, *Secretary.*

Dr. Marshall Langston Price, *Medical Officer.*

TABLE OF CONTENTS.

PART I.

PRELIMINARY REPORT.

PART II.

PREVALENCE AND DISTRIBUTION OF TUBERCULOSIS IN THE STATE OF MARYLAND.

PART III.

REPORT ON TUBERCULOSIS EXPOSITION.

PART IV.

ADDRESSES DELIVERED AT THE EXPOSITION.

PART V.

ACTS RELATING TO TUBERCULOSIS PASSED BY THE LEGISLATURE, PRESENTED BY COMMISSION OF 1904.

ADDENDA.

PRELIMINARY REPORT

OF

THE TUBERCULOSIS COMMISSION

OF

MARYLAND

To His Excellency,
Edwin Warfield, Governor of Maryland:

DEAR SIR:—The Tuberculosis Commission has the honour to transmit to you herewith a report of its work during the last two years.

Inasmuch as the entire edition of the preliminary report to Governor Smith was destroyed by fire, it has been deemed advisable to reprint this material as a preface to our present report.

Sincerely yours,

W. S. THAYER,

President of the Commission.

PART I

PRELIMINARY REPORT

I. GENERAL SUMMARY.

(1) TUBERCULOSIS IS A DISEASE DUE TO THE ENTRANCE INTO THE BODY OF A SPECIFIC MICROORGANISM—THE TUBERCLE BACILLUS.

(2) IT IS PROBABLE THAT UNDER ORDINARY CONDITIONS OF CITY LIFE TUBERCLE BACILLI GAIN ENTRANCE FROM TIME TO TIME INTO THE BODIES OF ALMOST EVERY INDIVIDUAL.

(3) IN MOST CASES THE HUMAN ORGANISM IS ABLE TO OVERCOME AND DESTROY THE INVADING MICROORGANISMS BUT UNDER SPECIAL CONDITIONS—HEREDITARY PREDISPOSITION—UNHYGIENIC SURROUNDINGS — DISEASE — DISSIPATION — OVERWORK—WORRY—ESPECIALLY MALIGNANT FORM OF THE MICROORGANISM—THE DISEASE GAINS THE UPPER HAND. SOME INDIVIDUALS AND FAMILIES SEEM TO BE ESPECIALLY PREDISPOSED TO TUBERCULOSIS. THE NATURE OF THIS PREDISPOSITION IS NOT UNDERSTOOD.

(4) TUBERCULOSIS PREVAILS ESPECIALLY DURING EARLY ADULT LIFE.

(5) THE MICROORGANISM USUALLY ENTERS THE ECONOMY THROUGH THE NOSE OR MOUTH BY RESPIRATION, THROUGH INFECTED FOOD OR THROUGH WOUNDS OF THE SKIN.

(6) THE BACILLI ARE SPREAD ABOUT CHIEFLY BY THE SPRAY EMITTED BY PATIENTS SUFFERING WITH THE DISEASE ON COUGHING OR SPEAKING AND BY THEIR EXPECTORATION.

(7) THE MOST IMPORTANT METHOD OF DISTRIBUTION OF THE TUBERCLE BACILLI IS PROBABLY PROMISCUOUS SPITTING.

(8) THERE ARE AT LEAST 10,000 CASES OF TUBERCULOSIS IN MARYLAND TO-DAY.

(9) DURING THE YEAR BETWEEN OCTOBER 1st, 1902, AND OCTOBER 1st, 1903, THERE WERE IN MARYLAND 2,509 DEATHS FROM TUBERCULOSIS.

(10) THE AVERAGE INDIVIDUAL LOSS ENTAILED BY THE DISEASE FOR EACH WAGE-EARNING MALE DYING FROM TUBERCULOSIS IN MARYLAND, IS $741.64.

(11) THE AVERAGE POTENTIAL LOSS TO THE COMMUNITY ENTAILED BY THE DEATH OF EACH WAGE-EARNING MALE IS $8,512.52.

(12) THE TOTAL POTENTIAL LOSS TO THE STATE ENTAILED BY THE DEATHS FROM TUBERCULOSIS EACH YEAR CANNOT AT THE VERY LOWEST ESTIMATE BE LESS THAN TEN MILLION DOLLARS.

(13) TUBERCULOSIS IS A PREVENTABLE DISEASE.

(14) THE MOST IMPORTANT PREVENTIVE MEASURES ARE:

(a) THE INSTRUCTION OF THE GENERAL PUBLIC AND OF THE SUFFERERS FROM THE DISEASE IN THE NATURE OF THE AFFECTION AND IN THE SIMPLE AND NECESSARY HYGIENIC MEASURES WHICH SHOULD BE CARRIED OUT IN THEIR ABODES, AS WELL AS THE EVENTUAL EMPOWERMENT OF THE STATE AND CITY HEALTH AUTHORITIES TO INSIST THAT THE MORE IMPORTANT OF THESE MEASURES BE CARRIED OUT.

(b) THE ENACTMENT AND ENFORCEMENT OF PROPER ANTI-SPITTING ORDINANCES.

(c) THE COMPULSORY NOTIFICATION OF THE CITY AND STATE HEALTH AUTHORITIES OF THE EXISTENCE OF EVERY CASE OF TUBERCULOSIS.

(d) THE INTRODUCTION AND ENFORCEMENT OF PROPER METHODS OF DISINFECTION OF PREMISES VACATED BY CONSUMPTIVES.

(e) THE ESTABLISHMENT OF HOSPITALS AND SANITARIA FOR THE CARE OF ADVANCED CASES, AS WELL AS CASES WHICH FROM THEIR NATURE AND SURROUNDINGS MAY BE A SOURCE OF DANGER TO THOSE ABOUT THEM.

(15) TUBERCULOSIS IS IN MANY INSTANCES A CURABLE DISEASE.

(16) THE IMPORTANT ELEMENTS IN THE TREATMENT ARE:

(a) REST.

(b) FOOD.

(c) FRESH AIR.

(17) THE ESTABLISHMENT OF PRIVATE SANITARIA HAS YIELDED MOST VALUABLE SERVICE IN THE TREATMENT OF THE DISEASE.

(18) THE ESTABLISHMENT AND MAINTENANCE BY THE STATE OF PROPER SANITARIA FOR (a) THE TREATMENT OF EARLY TUBERCULOSIS AND (b) THE CARE OF ADVANCED CASES OF THE DIS-

EASE WILL SAVE MANY LIVES, AND IN THE END WILL PROVE AN ACTUAL FINANCIAL BENEFIT TO THE COMMUNITY.

II. NATURE OF THE DISEASE.

Tuberculosis is an infectious disease due to the entrance into the body and growth at various points of a bacillus discovered by Koch in 1882. The name tuberculosis was given to the disease because of the fact that in most instances the earliest changes consist in the development at the points where the bacilli have settled, of small nodular masses called tubercles. These little masses which grow about the tubercle bacilli probably represent efforts on the part of the organism to surround, segregate, and destroy the germs. In many cases, however, the bacteria result sooner or later in the death of the surrounding tissues and the eventual breaking down and destruction of the diseased organ. In some parts, as in the lungs, the condition may proceed with great rapidity and the destruction of large parts of the organ may occur before the actual formation of tubercles. The name tuberculosis, however, has become definitely associated with the disease.

Recovery from tuberculosis may of course occur and in these cases the diseased areas become gradually replaced by permanent scar tissue.

Tuberculosis may affect almost any part of the organism. By far the commonest seat of the disease is in the lungs, although it not infrequently affects bones, joints, glands, the intestinal tract, the genito-urinary tract, the brain and its membranes or the skin.

Tuberculosis of the lungs is commonly known as "pulmonary consumption." As is well understood this may be an acute disease —"galloping consumption," lasting but a few weeks or months, or it may be a very chronic disease, lasting years.

A number of the other forms of tuberculosis are familiar to the public under various names.

Tuberculosis of the intestines may cause a chronic wasting diarrhea—"consumption of the bowels."

"Hip disease" is tuberculosis of the hip joint.

Curvature of the spine—that form which results in the deformity known as "hunchback" is due to tuberculosis of the spine.

"White swelling of the knee" is tuberculosis of the knee joint.

The "Brain fever" of children is commonly tuberculous meningitis.

"Scrofula," "King's Evil," "Waxing kernels" in the neck are due to tuberculosis of the lymphatic glands.

Not a few of the cases of dropsy with progressive wasting, especially in the young, are due to tuberculous peritonitis.

III. GENERAL PREVALENCE OF TUBERCULOSIS.

Tuberculosis is prevalent throughout the world. It occurs, however, with far greater frequency in cities and closely settled communities, while it is relatively rare in those regions where people live almost entirely out of doors. In urban populations, almost every one has at some time of his life suffered from small local areas of tuberculosis. Naegeli in Professor Ribbert's laboratory having carefully studied the bodies of 500 individuals at autopsy, found that 100 per cent. of those over 18 years of age showed unmistakable evidences of pre-existing tuberculosis, thus proving the truth of the celebrated remark of an old Viennese physician "Jedermann hat am Ende ein bischen Tuberkulose." (Every one has in the end a little tuberculosis.")

In the enormous majority of instances the organism soon overcomes the few germs which have gained entrance and recovery occurs without the appearance of any recognizable symptoms of the disease. Despite this fact the infection gains the upper hand in a number of cases so great as to call for the most active measures, both public and private, for its prevention and cure.

Tuberculosis is especially prevalent during early adult life; the greatest mortality from this disease occurs between the ages of 20 and 30.

Tuberculosis is widespread among animals as well as among human beings, although great differences in susceptibility to the disease exist. It is especially common among cattle where its existence is generally believed to be of danger to human beings.

In cattle, as in man, the disease is more common in thickly settled districts, and when the herd is once infected, spreads with considerable rapidity. Pearson and Ravenel estimated that in 1900 about 3 per cent. of the cattle in the state of Pennsylvania were tuberculous. In Saxony, 30 per cent. of all cattle are infected by this disease. The importance of the prevalence of tuberculosis among cattle may be realized from the conclusion of Pearson and Ravenel that "The disease causes more losses than all other infectious diseases of farm animals that exist in Pennsylvania at this time."

IV. GENERAL MORTALITY FROM TUBERCULOSIS.

Tuberculosis leads all other known diseases in the percentage of mortality which it causes. To this malady may be ascribed all the way from one-fifth to one-tenth of the total mortality of the world.

The estimated mortality from pulmonary tuberculosis per thousand living for the United States in the last census was 18.7*; for England 13.38; for Prussia 19; for Saxony 16.8.

The percentage of mortality from tuberculosis as compared with the total mortality for these same countries was for the United States 10.68; for England 9.7; for Prussia 9.1.

V. PREVALENCE OF AND MORTALITY FROM TUBERCULOSIS IN THE STATE OF MARYLAND AND IN THE CITY OF BALTIMORE.

(1) In the State of Maryland.

Owing to the fact that no reports are required by law of existing cases of tuberculosis it is impossible to obtain exact statistics as to the number of cases occurring yearly in this State. Our studies would lead us to believe that there are at present at least 10,000 cases of tuberculosis in the State of Maryland.

It is interesting to note that our reports come for the most part from the poorer and more unsanitary regions. It is true that the reports from these districts, from which the patients largely attend the dispensaries, are much more complete than those from other parts of the city and state. Yet the greater prevalence of tuberculosis in these regions is unquestionable.

In Baltimore during the last year there have been reported to the Boards of Health and to our Commission about 2,000 cases of tuberculosis.

All statistics show the great frequency of tuberculosis in the colored race and our figures bear out these general statistics.

The relation of tuberculosis to race as shown by the records of deaths from pulmonary tuberculosis for the year 1902 is as follows:

Deaths in Maryland for 1902.

All causes.		Tuberculosis.	
White.	Colored.	White.	Colored.
13,774	5,282	1,494	849

Ratio of deaths from tuberculosis to total mortality.

White.	Colored.
10.8	16.1

*These figures are based on returns from those regions only where there is reliable registration of the causes of death. These localities are for the most part thickly settled, so that the figures are undoubtedly higher than those for the whole country should be.

There were in 1902, 2,560 deaths from tuberculosis in all its forms in the State of Maryland.

The mortality from tuberculosis in Maryland differs but little from that elsewhere in this country. Compared with the mortality of the eastern states in which there are good records, Maryland stands at about the middle of the list with an estimated mortality of about 16.94 for each 10,000 of the population.

The relative proportion of deaths from tuberculosis to those from all other causes for 1900 was about 11 per cent., higher than in any other state excepting in Massachusetts, where the urban population is far greater.

(2) In the City of Baltimore.

There were in 1902, 1,392 deaths from tuberculosis in the City of Baltimore.

The mortality from tuberculosis in Baltimore as compared with that in New York, Chicago, Philadelphia, Brooklyn, St. Louis and Boston for the decade from 1892 to 1902 is shown in the following table:

Number of deaths from tuberculosis for each 10,000 of population.

Year.	Balto.	Boston.	Phila.	N. Y.	Chicago.	Brooklyn.	St. Louis.
1893	23.91	28.60	23.94	29.14	14.47	23.42	18.92
1894	23.90	29.27	22.05	25.74	13.75	23.55	16.20
1895	24.27	26.92	21.04	27.86	13.56	23.17	17.85
1896	23.49	25.73	21.15	26.20	14.27	21.89	18.00
1897	21.58	24.37	19.66	24.95	13.41	20.40	16.61
1898	21.53	22.90	20.88	25.08	14.64	21.96	16.07
1899	19.45	22.27	22.23	26.00	12.90	21.51	17.04
1900	20.76	22.23	21.00	25.69	15.30	20.90	17.49
1901	22.09	22.96	22.29	24.97	14.19	20.45	18.86
1902	22.06	20.65	21.07	22.87	14.04	18.78	18.21

It may be noticed here that Baltimore stands about at the middle of the list, although for the last year, 1902, the mortality is higher than that of all other cities excepting New York.

On comparing the figures of Baltimore with those of New York and Boston in which cities an active anti-tuberculosis campaign has been carried out for several years, it may be seen that the improvement which has occurred in these two cities is wanting with us.

VI. ECONOMIC EFFECTS OF TUBERCULOSIS IN MARYLAND.

In connection with the mortality and morbidity reports the Commission has endeavored to obtain some idea of the economical effects of tuberculosis upon the State of Maryland.

Excepting alone insanity, tuberculosis ranks first among all diseases in the proportion of its subjects who finally become dependent for assistance or support upon the state or community in which they live.

The life history of a consumptive may be divided economically into three periods:

(1) A period of unimpaired earning capacity preceding the onset of the disease and extending into its earliest stages.

(2) A period in which the patient is capable of irregular work at reduced wages.

(3) A period during which there is an entire loss of earning capacity with or without a condition of dependency. In this period the patient and his family become in a considerable proportion of cases, a source of direct loss to the community or state.

In order to gain some idea of the average loss to the individual and his family in a given case of tuberculosis Dr. Price has tabulated the figures regarding 177 wage-earning males who died in Maryland during the last year. The data for these figures were acquired by inquiry into the histories of patients whose deaths were reported to the state or city authorities, without regard to their social state, and it may be assumed that they fairly represent the average condition in this state.

Seventy-two or 40 per cent. of these men were in one way or another dependent upon charitable aid, while 26 or 14 per cent. died in charitable institutions. There is good reason to believe that the majority of the others received assistance at some time. Among those who finally became dependent were many receiving moderate incomes — contractors — bookkeepers — clerks — merchants.

In these individuals there was computed:

(1) The total individual final loss in earnings.

(2) The potential loss to the community. This latter can be readily computed by determining the annual income of the individual at the time of the onset of his disease and multiplying that by the number of years of expected life as estimated by the figures of insurance companies.

The average individual loss was found to be $741.64.

The average potential loss to the community resulting from the death from tuberculosis of a wage-earning male was $8,512.52.

During the year from October 1, 1902, to October 1, 1903, there were 2,509 deaths from tuberculosis in the State of Maryland. Of these 908 were wage-earning males. From these figures it would appear that from the deaths of wage-earning males alone there resulted in one year a potential loss to the community of over $7,500,000, while the total potential loss from the 2.509 deaths can scarcely have been under $10,000,000.

But these figures are far from showing the real effects of the disease upon the community. Indirectly the result of the death from tuberculosis of the father or main supporter of a family may be far-reaching. One of these other results which has impressed itself upon us, is the fact that in many instances the death of such an individual means the removal of children from school long before the proper time. The child must work to support the family, but he is thus started out in life with an education so imperfect as to permanently impair his earning capacity and to lower materially the general standard of education in the community.

These are impressive facts—facts which should move us to consider seriously what means we have to diminish the prevalence and mortality from tuberculosis.

VII. PORTALS BY WHICH TUBERCLE BACILLI MAY ENTER INTO THE ORGANISM.

There are a variety of ways in which tubercle bacilli may enter into the organism.

(1) Inhalation of spray or dust containing tubercle bacilli.

While it is known that tubercle bacilli may enter the mouth and nose in this manner, the course by which they actually reach the lungs or the various organs throughout the body in which they may subsequently settle, is by no means entirely certain. In many instances it is probable that through the tonsils and other lymphatic absorbing apparatus they enter into the lymph and blood to be distributed throughout the body, settling down eventually at the points of least resistance wherever these may be. It is possible, though not proven, that they may pass directly down the air tract into the lungs.

(2) Through the eating of infected food.

There is little doubt that tuberculosis may also enter the organism through infected articles of food. In these cases the tubercle bacilli may and often do produce disease of the intestines or of the glands in the abdomen which are connected with the intestines.

(3) Through the skin.

Direct inoculation may occur through wounds or abrasions of the skin in individuals handling infected material.

VIII. MANNER OF INFECTION.

How is tuberculosis usually acquired?

(1) Heredity and predisposition.

There are probably some who still believe that tuberculosis developing some years after birth has actually been inherited; that the child is born with the bacteria in his organism. While such a condition might theoretically exist it is certainly so excessively rare that actual inheritance of tuberculosis may be left out of consideration.

There can be little doubt that in many families an hereditary *predisposition* to tuberculosis exists. The importance of this hereditary predisposition is, however, sometimes over-estimated. The dangers incident to such hereditary tendencies may often be obviated by a proper manner of life. On the other hand, it is unquestionable that the resistance of the organism to tuberculosis may be greatly reduced by an improper manner of life—overwork—worry—dissipation—lack of proper food—indoor life—close and ill-ventilated dwellings.

(2) Inhalation.

As has been said, tubercle bacilli often enter the human organism by inhalation. How may this occur?

(a) *Spray.* One of the commonest methods by which transference of the disease occurs is through the inhalation of the spray emitted by infected individuals who frequently cough in a careless way without covering the mouth. Each cough throws into the air a fine spray which often contains bacilli that are readily inhaled by individuals who are in close proximity to the cougher. Infected spray may also be emitted in the simple act of talking. That this is a real danger has been shown by the experiments of Flugge, Heymann and others.

(b) *Dust.* Sputa or discharges or the infected tissues of animals or human beings allowed to remain in exposed positions soon dry and the bacilli are easily spread about in the form of dust.

Happily, the effect of sunlight in the open, soon destroys the microorganisms, but in dwellings and factories and cars, the inhalation of dust containing tubercle bacilli is probably a fruitful source of infection. Dust containing tubercle bacilli may be brought into clean houses upon the boots or clothes of uninfected individuals who have walked upon soiled streets or floors. The dusting and cleaning of these garments will set free the bacilli which may become sources of fatal infection. Professor Strauss some years ago demonstrated the presence of tubercle bacilli on cotton wads placed in the noses of attendants in the wards of a Parisian hospital.

(3) Eating of infected food.

(a) *Intrinsic infection.* Food, especially milk, butter, cheese and meat may be infected from the beginning with the bovine tubercle bacilli. This is especially common in the case of the milk of tuberculous cows which may contain large numbers of bacilli. That the ingestion of such products may cause human tuberculosis has been disputed by so distinguished an observer as Koch, but there is evidence which may be considered as positive that the disease may be acquired in this way. Strong support of this idea is afforded by the relatively greater frequency of intestinal tuberculosis in infants fed upon cow's milk.

(b) *Infection of food with human bacilli.* It is not only food containing bovine tubercle bacilli which may cause the disease. The spray spread about by coughing or infected dust may and probably often does, result in the deposition of bacilli upon milk and other varieties of food which do not kill the germs.

Flies and other insects doubtless spread bacilli in a like manner. No one who has observed the conditions of an ill-kept hospital or almshouse in the summer time can fail to appreciate the possible importance of the role played by flies.

As has been mentioned in connection with inhalation, the bacilli may be introduced into food through the hands and clothes of tuberculous patients as well as through the dusting of skirts or trousers or boots of individuals who have walked upon soiled streets or pavements or floors.

(4) Cutaneous infection.

Skin tuberculosis may be acquired by individuals who clean receptacles or floors or clothes containing tubercle bacilli; it is especially common in physicians who perform many autopsies.

While areas of skin tuberculosis thus arising may usually be permanently removed by excision, a fatal spread of the process has been known to follow.

(5) General Conclusions.

IN CONCLUSION IT MAY BE ASSERTED THAT WHATEVER DIFFERENCES OF OPINION THERE MAY BE AS TO THE COMMONEST METHOD OF ENTRANCE OF THE BACILLUS OF TUBERCULOSIS INTO THE ORGANISM THERE IS NO DOUBT IN THE MINDS OF ALL COMPETENT OBSERVERS THAT THE ENTRANCE OF THE TUBERCLE BACILLUS INTO THE HUMAN BODY IS THE PRIMARY CAUSE OF THE DISEASE AND THAT ANY METHOD BY WHICH THE BACILLUS IS SPREAD ABOUT IS A SOURCE OF DANGER TO THE COMMUNITY.

IT IS ALSO GENERALLY RECOGNIZED AND ACKNOWLEDGED THAT THE SPRAY FROM THE MOUTHS OF TUBERCULOUS PATIENTS AND THE GENERAL DISTRIBUTION OF THE SPUTA OF INDIVIDUALS AFFECTED WITH THIS MALADY ARE THE MOST IMPORTANT CAUSES OF THE SPREAD OF THE DISEASE.

IX. PROPHYLAXIS.

How can we best prevent the spread of tuberculosis?

(1) General principles of prophylaxis.

THERE IS EVERY REASON TO BELIEVE THAT THOUGH TUBERCLE BACILLI MAY LIVE FOR CERTAIN LENGTHS OF TIME OUTSIDE OF THE ANIMAL BODY AND MAY BE CULTIVATED ON SPECIALLY PREPARED MEDIA THEY FLOURISH ONLY IN THE LIVING BODY AND THAT IF DISSEMINATION OF THE BACILLI FROM DISEASED ANIMALS AND HUMAN BEINGS COULD BE PREVENTED THE MALADY COULD BE ARRESTED.

TUBERCULOSIS IS A PREVENTABLE DISEASE.

What steps should we take to prevent its spread?

The proper course to pursue is clear. THE SPUTA, DEJECTA, DISCHARGES, AND DEAD BODIES OF ALL ANIMALS AND HUMAN BEINGS SHOULD BE DISPOSED OF IN SUCH A MANNER THAT THEY ARE NO LONGER OBJECTS OF DANGER TO THE COMMUNITY. . .THOSE SUFFERING FROM TUBERCULOSIS AND THEIR FRIENDS SHOULD BE TAUGHT THOSE SIMPLE MEASURES WHICH RENDER THE PATIENT NO LONGER A DANGER TO THOSE WHO SURROUND HIM.

(2) Prophylactic measures in force in Maryland.

What are we doing here in Maryland?

(a) Laws with regard to animals.

There are no laws with regard to animals.

(b) Measures with regard to human beings.

(1) STATE MEASURES.

(a) *Anti-spitting ordinance.* There is a law forbidding spitting on the floors, steps and platforms of any railroad or railway passenger car in this state under penalty of three dollars and costs or, in default of payment of fine and costs, five days in jail (Act of the Legislature for 1902, chapter 581, p. 834.)

(b) *Free Examination of Sputa.* The State Board of Health examines free of charge for any physician in the state, specimens of suspected sputa.

(2) CITY MEASURES.

(a) *Anti-spitting ordinance.* There is an ordinance forbidding spitting on the floors of public buildings or upon the floors of street cars or public conveyances under the penalty of a fine of one dollar and costs. (Ordinance No. 16, 1898.)

(b) *Morbidity Reports.* The physicians throughout the city are *requested* to report to the Board of Health cases of pulmonary tuberculosis in their practice (Ordinance No. 75, add. sec. 164 a, B. C. C. 1893.)

(c) *Examination of Sputa.* The City Department of Health examines free of charge for any physician in the city of Baltimore specimens of suspected sputa.

(d) *Disinfection.* The Dept. of Health on the request of any physician, will disinfect rooms or houses previously occupied by tuberculous individuals.

These are the measures at present existing in Maryland.

The state law relating to the spitting upon the floors of steam railway cars has, so far as we know, been absolutely without effect.

The city ordinance while it has been of considerable value in reducing the amount of promiscuous spitting, is far from being properly enforced.

It is a striking fact that, at the present moment at all events, the officials and employees of the railway companies, the police force and the general public have but little appreciation of the importance of this matter. It is within the knowledge of the Com-

mission that a well known citizen has within the last year remonstrated with a high official of one of the important railways leading out of Baltimore upon the subject of promiscuous spitting in the cars. The reply was that the official did not desire to have notice posted in the cars while a further request that an order be issued to the employees to prevent the violation of the ordinance *by them* received a non-committal answer showing clearly the disinclination on the part of the railway official to carry out or draw any attention to this law.

The streets and sidewalks are covered with tuberculous sputa which dries and is distributed in the dust.

Patients with tuberculosis are in all occupations and in few are arrangements made for the reception of sputa.

The conditions existing in many houses and factories, especially in many sweat shops, are dreadful as a result of the ignorance and negligence of employers and employees as to the steps which should be taken.

(3) Prophylactic Measures in Force in other States and Cities.

What is being done elsewhere?

(a) State measures.

The only state measure of prophylaxis which has been adopted elsewhere consists in the free examination by the State Health Departments of specimens of sputa. This measure which as has been said, is in force in Maryland is of great value in allowing of the early and certain recognition of the disease.

(b) Municipal Measures.

By far the most important prophylactic measures against tuberculosis are those which have been initiated in New York and Boston. Those in New York may be considered as the best that have yet been devised. In brief these consist of:

(1) *An anti-spitting ordinance.* This ordinance forbids spitting upon the floors of public buildings, upon the surface and elevated cars, in railway stations and on steps, and on the pavements of streets within the curb stone. Notices are posted in the street cars in elevated stations and in other public buildings. The ordinance allows of a fine not larger than five hundred dollars or imprisonment for one year. This law has been actively enforced. several plain clothes men being sent out about every month to observe the violations of the law and cause arrests. As a rule, magistrates impose a fine of about two dollars and costs.

(2) *Compulsory notification of the Health Department of the existence of cases of tuberculosis.* Every physician is obliged by law to report to the Health Department all cases of tuberculosis occurring in his practice as in the case of other infectious diseases. This law which was opposed at first by many physicians through fear that their practice might be interfered with and that patients might be unnecessarily annoyed, has proved of so great benefit to the community that it is now generally observed, and Dr. Biggs estimates that 85 per cent. of the cases of tuberculosis in New York are reported to the Health Department. This information is confidential and the patient and family are never approached other than through the physician in charge.

(3) *Personal surveillance.* Most cases of tuberculosis treated by charity, all of those living in boarding houses, hotels and tenements, are personally visited by a special corps of medical inspectors who are assigned to various parts of the city. On request of the attending physician these inspectors will visit patients under private medical treatment. The department is informed by these officers as to the condition of the patient's surroundings, family and so forth. According to these conditions they may recommend (1) removal of the patient to the hospital; (2) renovation of the premises; (3) fumigation; (4) disinfection; (5) that no action be taken.

Further information is obtained as to the financial state of the family; as to whether assistance is necessary. Moreover, the hygienic factors demanded by the tenement house law are considered. The family is given a pamphlet issued by the Health Department printed in their native language. The pamphlet gives the necessary advice to the family and patient concerning his condition. The patient is expected to give the department notice if he changes his abode. If the inspector finds cases among the poor which have not been treated at the dispensaries he advises them to put themselves under the care, if not of hospitals or dispensaries, then of the Charity Organization Society.

(4) *House disinfection.* If the premises have been vacated by death or removal of a tuberculous patient, a paster is usually placed upon the door giving notice that the room has been occupied by a consumptive and forbidding its further occupancy until renovation or disinfection has been carried out. Disinfection is carried out by the Board and if renovation be necessary the Board of Health has authority to demand it of the owner of the building.

These measures have resulted in the fact that much better care is taken of tenements than has previously been the case.

(5) *Hospitals for advanced cases.* A limited number of advanced cases of tuberculosis are taken care of at the pavilion on North Brother Island and in the Consumptive Pavilion attached to the Municipal Hospital on Blackwell's Island. Apart from the value of treatment to the patient himself, hospital advantages for cases of advanced tuberculosis are of great importance to the community in removing from the families of the ignorant and indigent the most dangerous source of infection. In some cases the department has ordered the removal to the consumptive pavilion on North Brother Island of individuals who had refused to take the simple precautions ordered by the Board of Health and were owing to the existing conditions, dangerous to those about them.

(6) *Educational measures.* By lectures, circulars, publications in the daily papers and personal visiting, the Charity Organization Society in New York is doing a great service to the community. Indeed, it is not improbable that systematic educational measures are likely to prove of more lasting value to the community than any other step which has been taken.

X. TREATMENT.

TUBERCULOSIS IS IN MANY INSTANCES A CURABLE DISEASE.

(1) General principles of treatment.

What are the essential principles in its treatment?

There is no specific for tuberculosis. If, however, the disease be recognized at a sufficiently early period it may in many cases be entirely arrested. And the successful treatment of tuberculosis depends upon several perfectly simple principles.

(1) *General hygiene.*

Under this heading is included rest, mental and physical, freedom from care, cleanliness and proper care of the person.

(2) *Food.*

The diet should be simple but abundant. The patient should be given systematically *as much nourishing food as he can possibly absorb.*

(3) *Fresh air.*

It is of especial importance that patients with tuberculosis should live and sleep as far as possible in the open air.

These principles of treatment have been recognized by wise observers for centuries but their advantages have been brought

forth within a comparatively few years by the striking results which have been achieved in well ordered sanitaria.

(2) Dispensaries.

Private sanitaria.

The most successful sanitaria have been those established in the open country, usually at some altitude. Here the patients are kept at rest and are obliged to remain out of doors during the entire day and to sleep at night, either out of doors or with the windows wide open. An abundance of simple nourishing food is supplied. This is administered systematically so that the patient is really under a regime of what is sometimes called "forced feeding." With improvement an increase in the amount of exercise is gradually allowed until finally the patient in favourable cases is discharged with the disease arrested.

It may well be asked: "Why may not the same results be obtained in any private house?" They may. But the great advantages of sanitaria for tuberculous patients consist in:

(1) *The medical supervision* by which the patient is properly controlled and taught the proper manner of life.

(2) *The freedom from care and the temptation to work* which can rarely be obtained at home.

(3) *The advantages of society and companionship and example* offered by the other patients; for the mental attitude of the sufferer has a great effect upon the course of the disease.

One of the greatest advantages of sanitaria is that the patient is taught the proper manner of life which he is able later to carry on at home and to inculcate in those about him.

What have sanitaria accomplished?

The good that sanitaria have done may be demonstrated by two simple statements.

The Adirondack Cottage Sanitarium. In the first place, the remarkable statistics of the Adirondack Cottage Sanitorium recently published by Brown. Out of 1066 cases whose history has subsequently been followed, treated at this sanitarium during a period from 18 up to 2 years ago, 31 per cent. are well.

Out of 258 cases which were classed as "incipient" at the time of admission 66 per cent. are well.

Out of 563 cases which were classed as "advanced," 28.6 per cent. are to-day well.

Sanitaria of German Insurance Companies. Impressive testimony as to the value of sanitaria is afforded by the fact that the insurance companies of Germany have within the two years, 1897

and 1898 spent over $1,000,000 for the establishment and maintenance of sanitaria for the treatment of cases of tuberculosis previously insured by them.

Public dispensaries and sanitaria.

While the physician in his private practice, and sanitaria controlled by private individuals may successfully manage many cases of tuberculosis, they fail to reach the great mass of the community of but limited means, or indeed, dependent upon charity; these people must be provided for in another manner. This leads us to the question of public measures.

Dispensaries.

Much good may be done by the establishment of special sections for tuberculosis in the Out-Patient departments of hospitals and free dispensaries in cities and towns. In these dispensaries the careful examination of the patient results often in the detection of the disease at a period sufficiently early to save the patient's life, while in the more advanced cases advice may be given him and his family which not only may prolong his life but may save those about him from contamination.

The model institution of this class is the Phipps Institute of Philadelphia.

Public Sanitaria.

(1) *State sanitaria.* The Massachusetts sanitarium may be taken as a model for what may be accomplished in this line. This sanitarium, built in 1896 at a cost of $150,000, was last year enlarged at an expense of $127,000. It is conducted at an annual expense of between ninety and one hundred thousand dollars. The hospital is situated on high land at Rutland, fifty miles west of Boston, with beautiful country surroundings. It is designed for the treatment and cure of tuberculosis. It is therefore intended only for early cases, those in whom there is a good probability of securing a permanent arrest of the disease. Each patient pays a minimum charge of four dollars a week. This charge is universal; it is, however, often paid for the individual by cities or towns or charitable societies. The total weekly cost per individual for 1902 was $9.95, leaving a weekly cost to the state per patient of five dollars and ninety-five cents. The hospital is now capable of accommodating two hundred and fifty patients and is always full. The results obtained by this institution in the few years of its existence have been most gratifying. In the year 1901-2, 78 per cent. of those cases which on admission were classed as "incipient" were

discharged with the disease arrested. In a large proportion of these cases one is justified in assuming that the arrest will prove a permanent cure.

The value of such an institution can scarcely be over-estimated. In Massachusetts it has been much appreciated by the public, the demand for admission being so great as to call for the enlargement of the institution two years ago.

(2) *City sanitaria.* The city of New York has probably the best accommodations in this respect.

Sanitaria for advanced cases. The most striking feature in the New York system is the existence on North Brother Island of pavilions for the accommodation of advanced cases of tuberculosis. This hospital does not give sanitarium treatment to early cases but does care for and segregate patients with advanced consumption, thus freeing their families and the public in general from one of the gravest sources of danger.

Sanitaria for the treatment of early tuberculosis. A hospital for the treatment of tuberculosis as a part of the city hospital is situated on Blackwell's Island. While the arrangements are not as yet what they might be, the situation of the buildings is excellent and the care taken of the patients is rapidly improving under the efforts of the admirable Health Department of New York.

XI. RECOMMENDATIONS AS TO FURTHER PROPHYLACTIC AND THERAPEUTIC MEASURES, WHICH MAY BE TAKEN IN MARYLAND.

What can we do in Maryland toward the prevention and treatment of tuberculosis in the State and city?

(1) State measures.

(a) *Enforcement of anti-spitting ordinance.* It is urgently recommended that an amendment be made to the present law forbidding spitting upon the floors, seats and platforms of railroad or railway passenger cars which shall extend this law so as to cover the decks of steamboats, the floors of all public conveyances and of state buildings, and further directing that notices forbidding spitting upon the floors and calling attention to this act be posted in all public conveyances.

(b) *State Notification.* It is advised that the act requiring notification of the State Board of Health of the existence of certain infectious diseases be amended so as to include tuberculosis in all its forms.

(c) *Disinfection.* It is recommended that the law requiring disinfection of premises after their occupation by persons suffering from certain infectious diseases be amended so as to include tuberculosis.

(d) *Sanitaria.* It is believed that the establishment of state sanitaria for the care and treatment of consumptives will be of lasting benefit to the state and to the community and that whatever expense may attend the founding and maintenance of these plants will be ultimately more than repaid by the results of treatment.

(2) City measures.

(a) *Anti-spitting ordinance.* It is recommended that the anti-spitting ordinance be extended so as to include as in New York, the sidewalks within the curb stones, that the penalty be increased so as to read not less than two nor more than twenty dollars' fine.

(b) *Notification.* It is recommended that notification of the Health Department by physicians of the existence of cases of tuberculosis in their practice be required.

(c) *General surveillance.* It is recommended that a system of personal surveillance by agents of the Health Department on a plan similar to that carried out in the city of New York be introduced at the earliest practicable moment.

(d) *Disinfection.* It is recommended that disinfection and renovation of the houses and rooms vacated by tuberculous patients be provided for and insisted upon.

(e) *Educational measures.* It is recommended that an annual lecture or lectures be provided for by the city to be delivered to the teachers in the public schools of Baltimore upon hygiene with especial reference to tuberculosis. It is further highly desirable that active educational measures should be undertaken under private auspices similar to those which are now so admirably conducted in Boston and New York.

* * * * *

This Commission is convinced that the establishment in Maryland of state sanitaria for the care and treatment of consumptives is much to be desired. We are indeed of the opinion that such sanitaria are urgently required as well for humanitarian reasons as for the safety and well-being of the community. We believe that the establishment of such sanitaria will, from a purely material standpoint be an economical measure.

We are of the opinion, however, that the problem should be approached in a most careful and deliberate manner. We have in Maryland advantages in climate and soil and locality for the establishment of sanitaria excelled in but few states in the Union. In a matter of such capital importance as this, it is desirable that no false or hasty step be taken, but that the most be made of our material advantages as well as of the experience of those who have preceded us in similar undertakings in this and other countries.

If the State of Maryland undertakes to build sanitaria for the treatment of tuberculosis every step should be taken to make these sanitaria the best in existence.

With these ends in view we would suggest the appointment by the Governor of Maryland of a Commission for the specific purpose of considering plans, expenses, localities and any other questions looking toward the establishment of:

(1) A sanitarium or sanitaria for the care of cases of chronic tuberculosis.

(2) A sanitarium or sanitaria for the treatment and cure of early and favorable cases of tuberculosis.

Such a Commission with the advice and assistance of a board of health of so high a grade of efficiency as that which now honours our state will we believe succeed in forming suitable and feasible plans.

* * * *

Tuberculosis Exposition.

With a view to facilitating the proper consideration of this subject and with the desire to excite a more general public interest in and a wider general knowledge of the nature of tuberculosis and the measures necessary for its restriction and treatment, this Commission in association with the State Board of Health and the Maryland Public Health Association, have arranged for a *Tuberculosis Exposition* to be held in Baltimore during the week from January 25th to February 1st.

The Exposition is under the immediate direction of a committee of which Dr. Henry Barton Jacobs is chairman. It will be held at McCoy Hall, the use of which has been most generously offered to us by the Trustees of the Johns Hopkins University.

There will be exhibits illustrative of the history and nature of the disease. Statistics illustrating its prevalence and the re-

sultant mortality will be graphically presented. Plans, models and statistics of dispensaries and sanitaria for the treatment of the disease have been promised from most of the important institutions in this country and in Europe.

There will be daily lectures and demonstrations by distinguished authorities on tuberculosis upon the various phases of the problem.

The plan of this exposition, the first of its kind, has excited a widespread interest; it is hoped that it may prove of real value to the state and the community.

PREVALENCE AND DISTRIBUTION

OF

TUBERCULOSIS IN THE STATE OF MARYLAND

The Honorable Tuberculosis Commission of Maryland,
Dr. Wm. S. Thayer, President:

SIR:—I have the honor to present for your consideration a report on the Prevalence and Distribution of Tuberculosis in Maryland.

The discussion of this point has been mainly limited to racial, political and geographical divisions. The compass of this report does not permit of an extensive study of the occupational relations of tuberculosis.

I would particularly call your attention to the high infantile mortality in Maryland as tubercular infection at this period of life should be easily susceptible of control.

The tabular matter comprising general mortality statistics comprises mainly 1900, 1901, 1902 and 1903 while morbidity and other special statistical tables are constructed from the data of the Commission for the year 1903.

Respectfully submitted,

MARSHALL LANGTON PRICE,

Medical Officer.

PART II

PREVALENCE AND DISTRIBUTION OF TUBERCULOSIS IN THE STATE OF MARYLAND.

In determining the prevalence and distribution of tuberculosis in Maryland there were mainly considered the following principal headings:

(a) The mortality from tuberculosis in Maryland.

(b) The morbidity from tuberculosis in Maryland.

(c) The distribution of the mortality and morbidity according to cities, towns and communities.

(d) The distribution of the mortality and morbidity according to age, race, sex, occupation, social condition, etc.

(e) Accessory and associated causes.

The large colored population of Maryland and their large racial mortality and morbidity from tuberculosis, falling with equal severity on full-blooded negroes and mulattoes, made the study of tuberculosis among the colored race of great importance; and racial factors have been considered in all these statistics at length. The natural division of the population of Maryland into an almost wholly urban and an almost wholly rural population gave great facility in the comparison of the rural and urban mortality and morbidity. This comparison has been made in nearly all the statistics considered in this report. The name "state," when used in such statistical tables, should be taken to indicate the State exclusive of the population of Baltimore city. This method of consideration causes the population of Maryland to fall into two nearly equal classes. The "urban population" comprising Baltimore city with a little less than one-half of the population of Maryland, and the "rural population" comprising the remainder of the inhabitants of Maryland, or a little more than one-half the total population. None of the four principal towns following after Baltimore in order of importance contain more than between seventeen and eighteen thousand inhabitants.

The population of these towns is as follows:

Cumberland	17,128
Hagerstown	13,591
Frederick	9,296
Annapolis	8,525

The division of the urban and rural population is shown below for the year 1900. (U. S. Census.)

Population of Baltimore City	508,957
Population of 'State'	679,087
Maryland	1,188,044

The tubercular death rate for Maryland is somewhat greater than for the United States at large. Maryland has shared the general fall in the tubercular mortality in the United States during the past ten years, though not to such a marked degree.

The absolute mortality from tuberculosis and seven other principal causes of death in the United States during the census years 1890 and 1900 is given in the following table:

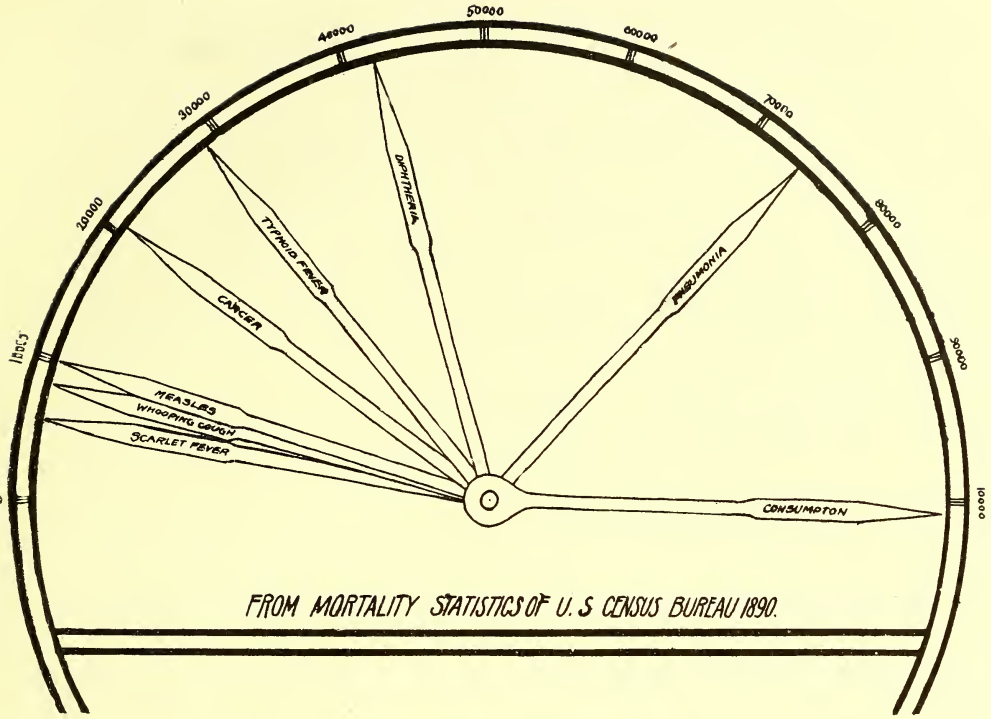
ABSOLUTE NUMBER OF DEATHS IN UNITED STATES IN CENSUS YEARS 1890 AND 1900.

(U. S. Census of 1890 and 1900.)

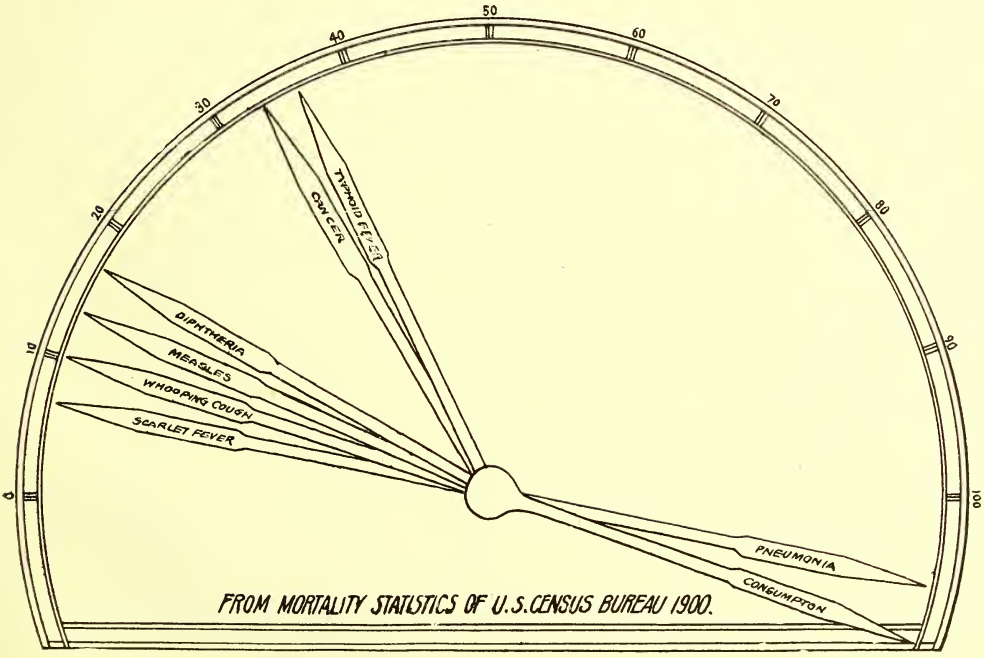
	1890.	1900.
Scarlet fever	5,969	6,333
Whooping cough	8,432	9,958
Measles	9,256	12,866
Cancer	18,536	29,475
Typhoid fever	27,058	35,379
Diphtheria	27,815	16,475
Pneumonia	76,496	105,971
*Consumption	102,199	111,059

* Including general tuberculosis.

These mortality statistics are shown in dial form in the following two charts adopted by Dr. Fulton from Professor Hewes' dial, for the census years 1890 and 1900.



FROM MORTALITY STATISTICS OF U. S CENSUS BUREAU 1890.



FROM MORTALITY STATISTICS OF U.S.CENSUS BUREAU 1900.

The actual and proportionate mortality from the two principal causes of death in the United States, i. e. pneumonia and consumption, are given in the succeeding table:

Consumption, U. S. Census—
1890—102,199—Ratio.....122.3 per 1000
1900—109,150—Ratio.....109.9 per 1000
Decrease per 1000=12.4
Pneumonia, U. S. Census—
1890— 76,494—Ratio..... 90.6 per 1000
1900—105,971—Ratio.....106.1 per 1000
Increase per 1000=15.5

The second of these dials shows an apparent increase in the importance of pneumonia as a cause of death, but Dr. Klebs has recently shown that this increase falls largely in the period of infancy and it probably depends to some extent on a more accurate classification of several of the maladies peculiar to early life.

The mortality of the State of Maryland is influenced by the considerable colored population which it contains. Among registration States Maryland ranks sixth in the ratio of its tubercular mortality. If the District of Columbia be excluded, the population of which is practically all urban (comprising mainly the city of Washington) Maryland then takes second place in its proportionate mortality.

COMPARATIVE MORTALITY FROM TUBERCULOSIS IN REGISTRATION STATES.†

(All of the figures are compiled from the United States Census of 1900, excepting Maryland, which is mainly derived from the Report of the State Board of Health for 1900.)

State.	Total number of deaths from consumption census year, 1900.	Death rate consumption per 10,000 of population.	Proportionate mortality consumption to the total deaths from all causes per 1,000.
1. Dist. Col.....	851	30.53	133.7
2. Rhode Island.....	837	19.53	102.3
3. New York.....	14,110	19.41	108.3
4. Massachusetts	5,224	18.62	155.0
5. New Jersey.....	3,392	18.01	103.6
6. Maryland *	2,012	16.94	110.5
7. Connecticut	1,529	16.83	99.2
8. Maine	1,145	16.49	94.2
9. Vermont	524	15.25	90.0
10. New Hampshire	627	15.23	84.8

† Excepting Michigan, the returns for which are not reliable for the census year 1900.
* Estimated mortality.

The States are arranged in order of death rate per 10,000 of population. Assigned in order of proportionate mortality the arrangement becomes somewhat changed. Maryland then takes third rank, but the District of Columbia still retains first place, and New Hampshire still the last.

The mortality of Baltimore city exceeds that of the State at large to a very considerable degree.

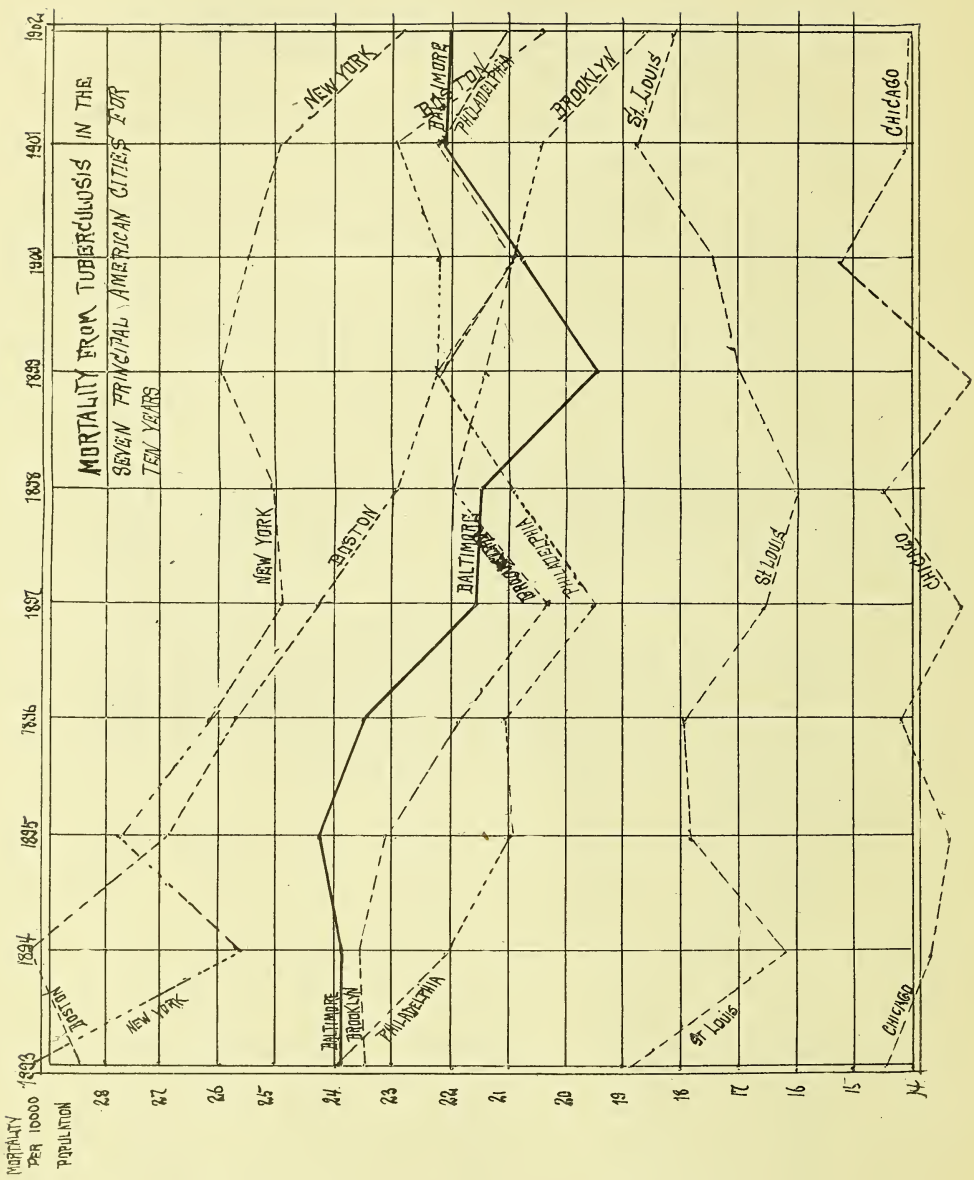
In the table given below the State and city mortalities are compared for the three years during which Maryland has been a registration State.

COMPARISON OF THE MORTALITIES OF BALTIMORE CITY AND OF MARYLAND, EXCLUSIVE OF BALTIMORE.

	1900.	1901.	1902.
Deaths due to tuberculosis in Maryland, exclusive of Baltimore	949	1160	1168
Deaths from tuberculosis, Baltimore City	1056	1138	1159
Ratio State to general mortality	12.07%	13.02%	15.58%
Ratio Baltimore general mortality	20 76%	22.09%	22.06%

In the following tables the mortality rates of the principal cities of the world are compared with that of Baltimore city.

The comparison of the tubercular mortality of Baltimore with that of the six leading cities of the country is given on page 8 of the Preliminary Report and is shown graphically on the accompanying chart.


MORTALITY FROM TUBERCULOSIS IN THE SEVEN PRINCIPAL AMERICAN CITIES FOR TEN YEARS
MORTALITY PER 10000 POPULATION
1893
1894
1895
1896
1897
1898
1899
1900
1901
1902
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
NEW YORK
BOSTON
BALTIMORE
BROOKLYN
PHILADELPHIA
ST LOUIS
CHICAGO

DEATHS PER 10,000 PULMONARY TUBERCULOSIS.

(Muncher med. Wochenschrift.)

Cities.	Population.	1894.
France.		
Le Havre	116,000	50.3
Rouen	111,000	45 0
Paris	2,424,000	41.0
Nancy	86,000	33.0
Lyon	431,000	33.6
Reims	105,000	32.6
Nantes	122,000	30.1
Roubaix	115,000	29.7
Lille	70,000	28.2
Bordeaux	252,000	25.5
Saint Etienne	131,000	23.5
Marseilles	406,000	21.8
Toulouse	148,000	17.7
Alger	83,000	16.5
Germany.		
Wurzburg	65,000	52.4
Nuremburg	161,000	39.3
Breslau	361,000	34.9
Augsburg	81,000	33.5
Munich	393,000	30.8
Cologne	309,000	28.2
Frankfort	201,000	27.2
Elberfeld	138,000	26.6
Dresden	316,000	26.0
Altona	149,000	24.7
Leipzig	404,000	24.0
Gorlitz	67,000	24.3
Chemnitz	150,000	22.7
Berlin	1,703,000	22.3
Hamburg	604,000	21.1
Lubeck	69,000	16.6
Other Countries.		
Budapesth	552,000	49.3
Vienna	1,465,000	45.4
St. Petersburg	954,000	44.3
Moscow	753,000	42.9
Warsaw	500,000	25.7
New York	1,925,000	24.1
Philadelphia	1,115,000	23.7
Glasgow	686,000	22.6
Naples	535,000	21.1
Buenos-Ayres	580,000	20.7
Manchester	522,000	19.6
London	5,300,000	17.3
Chicago	1,600,000	13.4
Baltimore	**508,957**	**20.7**

Of the cities whose mortality records are entirely reliable Baltimore and Philadelphia show a practically stationary curve during the past decade. The death rate of Baltimore from tuberculosis has even shown a slight rise in the past five years and at the

end of 1902 the Baltimore curve has risen above that of all of the principal cities with the exception of New York.

The tubercular and general mortality of Baltimore city for the twelve years from 1890 to 1902 is shown in the following table:

THE TUBERCULAR AND GENERAL MORTALITY OF BALTIMORE FOR THE TWELVE YEARS ENDING 1902.

Year.	Estimated§ population.	Total deaths.	Pul. tub. deaths.	Death rate per 10,000.	Per cent of tuberculosis to general mortality.
1890	434,439°	10,198	1,249	28.80	12 25
1891	441,338	10,073	1,073	24.31	10.65
1892	449,346	10,582	1,127	25.14	10.65
1893	455,466	9,554	1,099	23.91	11.50
1894	462,699	9,486	1,106	23.90	11.66
1895	470,047	10,301	1,141	24.27	11.07
1896*	477,511	9,919	1,122	23.49	11.31
1897	485,094	9,329	1,047	21.58	11.22
1898	492,797	10,385	1,061	21.53	10.21
1899	500,623	10,152	974	19.45	9 59
1900	508,967‡	10,700	1,056	20.76	9.87
1901	517,054	10,479	1,138	22.07	10.86
1902	525,270	10,253	1,159	22.06	11.30

* The act requiring the notification of pulmonary tuberculosis was approved May 12th, 1896. The attempt to enforce this was followed by a fall in both the general and tubercular death rate. The continued fall in the latter may be in part ascribed to the rise of the industrial insurance companies.

§ The population for 1890 and 1900 was taken from the census of these years. The population of the intervening years was computed from a yearly increment of 1.58 per cent.

° Census of 1890.

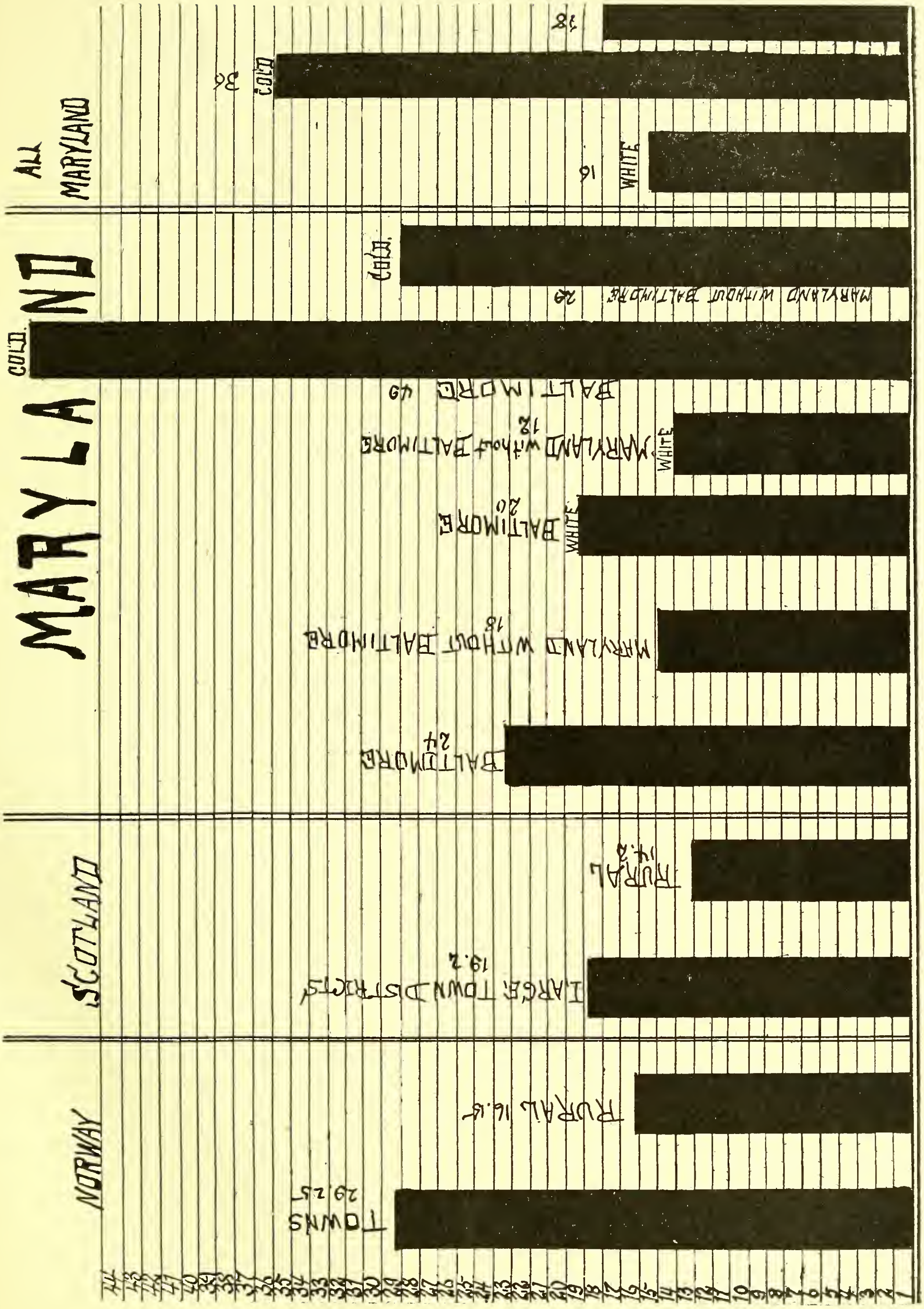
‡ Census of 1900.

The general distribution of the colored population in Maryland is shown for Baltimore city and Maryland for the census year 1900 in the following table:

	White.	Colored.
Maryland	952,424	235,064
Baltimore City	429,218	79,258

On page 7 of the preliminary report the mortalities of the white and colored races in Maryland is compared.

The accompanying chart prepared by Dr. Fulton shows the white and colored mortalities in Maryland and separately for the urban and rural populations. The urban and rural mortalities of Norway and Scotland are shown on the same table.



NORWAY
TOWNS 29.25
RURAL 14.5
SCOTLAND
LARGE TOWN DISTRICTS 19.2
RURAL 14.2
MARYLAND
BALTIMORE 24
MARYLAND WITHOUT BALTIMORE 18
WHITE BALTIMORE 20
WHITE MARYLAND without BALTIMORE 12
COLD. BALTIMORE 49
COLD. MARYLAND WITHOUT BALTIMORE 29
ALL MARYLAND
WHITE 16
COLD 36
18

The mortality in the various counties for the census year 1900 is given in the accompanying table. The returns are reliable only for those counties printed in capital letters.

The second table gives the mean mortality in each of the counties for the three years 1900, 1901 and 1902 and gives fairly reliable returns for all counties excepting Garrett and St. Mary's counties. The returns for three years in the latter county give an annual mortality from all causes of only 5 per 1,000!

The figures for three years have been selected for comparison as giving a much greater degree of accuracy. The county showing the highest mortality is Calvert County, with a mortality of 28 per 10,000 of population. Two counties show a mortality below 10 viz: Carroll and Allegany counties.

County*	Population, 1900.	Deaths from all causes, 1900.	Deaths from tuberculosis.	Death rate from tuberculosis per 10,000 of population.	Proportionate mortality from tuberculosis to 1,000 deaths from all causes.
Alleghany	53,694	389	40	7.45	102.90
Anne Arundel	39,620	470	64	16.15	103.62
BALTIMORE	90,755	1,484	188	20.72	126.69
CALVERT	10,223	145	32	31.30	220.68
Caroline	16,248	102	13	8.00	127.45
Carroll	33,860	278	29	8 56	104.31
CECIL	24,662	371	46	18.69	123.99
Charles	17,662	39	9	5.10	230.77
Dorchester	27,962	283	35	12.52	123.69
FREDERICK	51,920	648	53	10.20	81.79
Garrett	17,701	105	4	2.26	38.09
HARFORD	28,269	347	37	13.09	106.62
HOWARD	16,715	228	36	21.54	157.89
KENT	18,786	299	48	25.55	160.53
Montgomery	30,451	241	33	10.84	136.93
Prince George	29,898	247	35	11.70	142.10
Queen Anne	18,364	237	34	18.51	147.19
Somerset	25,923	167	21	8.08	125.74
St. Mary's	17,182	94	8	4 65	85.10
TALBOT	20,342	239	29	14.26	121.33
WASHINGTON	45,133	571	78	15.07	136.60
Wicomico	22,852	167	22	9.63	131.73
WORCESTER	20,865	278	45	21.08	161.87
BALTIMORE CITY	508,957	10,198	1,249 Pulmonary forms only.	28.80	122.50

* The county returns for 1900 are incomplete and only those counties marked by capitals show a moderate degree of accuracy.

MEAN DEATHS FROM TUBERCULOSIS IN MARYLAND FOR THE THREE YEARS—1900, 1901, and 1902.

County.	Mean population.*	Mean deaths from all causes.	Mean deaths from tuberculosis.	Mean death rate per 10,000 population.	Mean proportionate mortality from tuberculosis to 1,000 deaths from all causes.
Alleghany	54,397	517	53	9.74	103
Anne Arundel	40,139	497	75	18.68	151
Baltimore	91,944	1,425	175	19.03	123
Calvert	10,357	165	29	28.00	175
Caroline	16,461	157	24	14.54	160
Carroll	34,303	316	33	9.62	104
Cecil	24,984	373	33	13.25	89
Charles	17,893	203	29	10.60	143
Dorchester	28,328	311	47	16.59	152
Frederick	52,600	695	76	14.45	109
Garrett	17,933	96	5	.....	.....
Harford	28,639	389	47	16 41	121
Howard	16,924	218	34	20.08	156
Kent	19,032	303	45	23.64	148
Montgomery	30,850	265	38	12.32	142
Prince George	30,299	421	58	18.81	138
Queen Anne	18,605	260	37	19.88	143
Somerset	26,263	185	32	12.18	173
St. Mary's	17,407	87	10	.....	.....
Talbot	20,608	308	45	21.83	146
Washington	45,724	662	84	18.37	127
Wicomico	23,151	235	42	18.14	180
Worcester	21,138	312	48	22.70	154
Baltimore City	515,625	10,477	1,118	21.64	107

*Calculated on the radicle 1.0131n from the U. S. Census figures (1900).

Five counties, Calvert, Howard, Kent, Talbot and Worcester, give a mortality of over 20. In four of these the mortality exceeds that of Baltimore city viz: Calvert, Kent, Talbot and Worcester.

The high mortality in these counties apparently depends upon the large colored population which they contain. This is especially the case in Calvert County, in which the negroes predominate and the tubercular mortality reaches 28 per 10,000 of population.

The proportionate mortality from tuberculosis of these counties does not decline in proportion to the fall in the death rate. That is the rural conditions have an even greater effect on the general than on the tubercular mortality. The proportionate mortality in eighteen of the twenty-two counties considered, ranges above that of Baltimore city (107). It is probable that the diminution in the mortality due to rural conditions is greater in the

non-tubercular infantile diseases such as broncho-pneumonia and infantile diarrhea, than in tuberculosis and for this reason the proportionate mortality is high. The analysis of urban conditions in Maryland is impossible as there are no towns excepting Baltimore in the State falling under the United States census classification of urban communities. The largest of these towns is Cumberland, with a population of only a little over 17,000. The town of Cumberland lies at a considerable elevation in the Alleghany mountains and is diffused over a considerable area. A small part lies in the valley and the remainder ascends the sides of the mountains. Owing to these facts the conditions in Cumberland do not approach the urban as closely as those of Annapolis, which has a population of only 8,500. The population is moreover almost wholly white. Somewhat similar conditions exist in Hagerstown, the next town in order of population.

These two towns have the lowest mortality among the four leading towns of the State, including Baltimore city.

In the following table the tubercular mortalities of Annapolis, Cumberland, Frederick and Hagerstown are compared with that of Baltimore city.

1903.

DEATHS FROM TUBERCULAR DISEASES IN BALTIMORE AND THE FOUR PRINCIPAL TOWNS OF MARYLAND.

	Population.	Total deaths.	Deaths tuberculosis.	Mortality rate tuberculosis per 10,000 population.	Proportionate mortality per 1,000 deaths, all causes.
Annapolis	8,525	155	28	32.84	181
Cumberland	17,128	375	39	22.77	104
Frederick	9,296	195	26	27.90	133
Hagerstown	13,591	212	25	18.47	118
Baltimore City	508,957	10,198	1,249*	28.80*	122

* Pulmonary forms only.

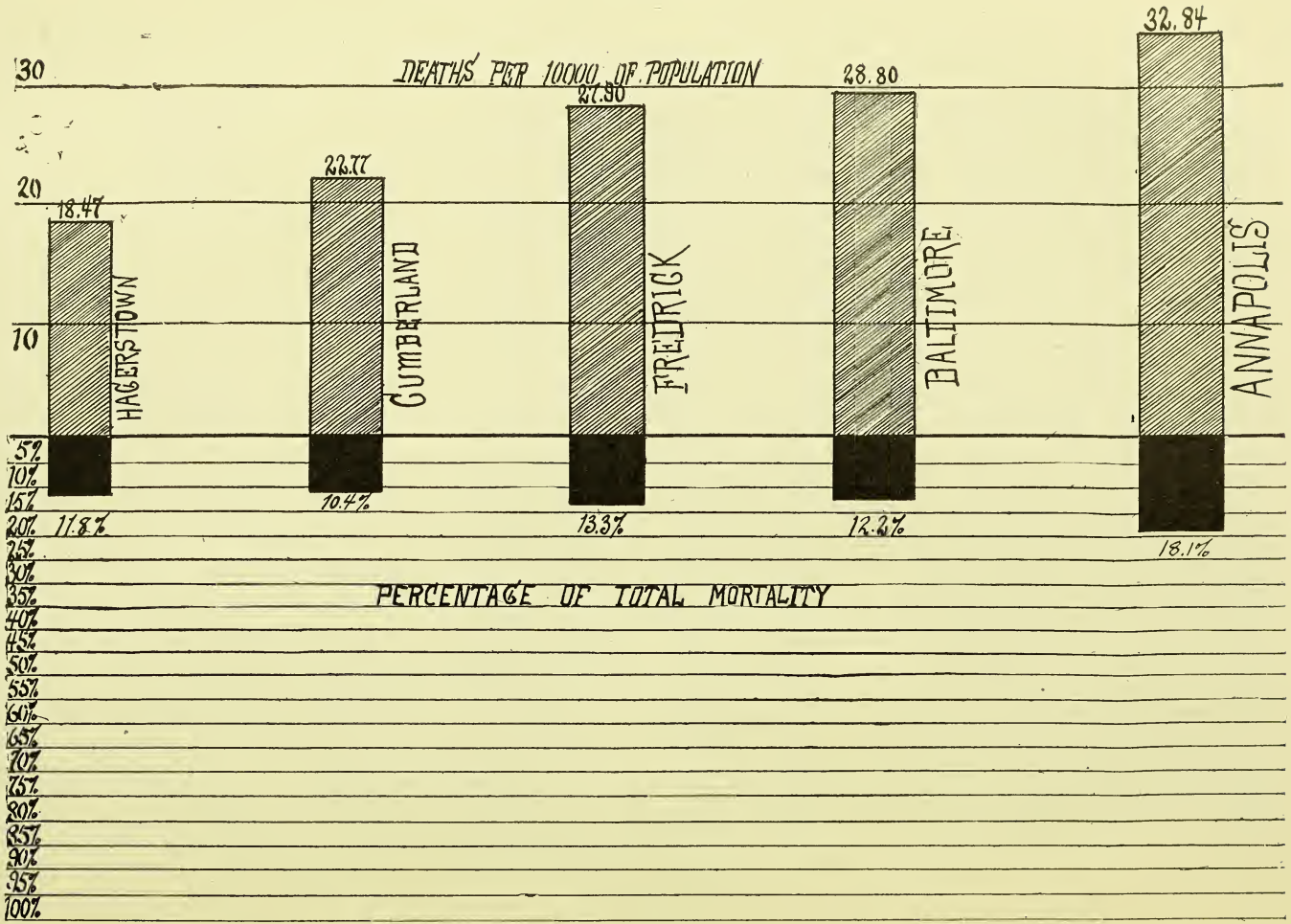
It will be seen by this table that the highest mortality among these towns is that of Annapolis, with a death rate from tuberculosis of 32.84 per 10,000 of population rising far above that of Baltimore city and exceeding that of Hagerstown by nearly 100

per cent. All the other towns in Maryland have tubercular mortalities below that of Baltimore.

Upon analysis the great excess in the mortality of Annapolis is seen to be mainly due to the large colored population, though the white mortality still exceeds that of Baltimore, as shown in the following table. The proportionate mortality is very high moreover for both the white and colored populations; in other words, while of every ten white persons dying in Baltimore one dies of tuberculosis, one in every seven dying in Annapolis perishes of the disease and the proportionate mortality among the colored rises to such a point that nearly one in every five of the colored population dies of tuberculosis.

MORTALITY FROM TUBERCULAR DISEASES AMONG WHITE AND COLORED POPULATIONS OF BALTIMORE AND ANNAPOLIS.

	Population.		Mortality per 10,000 of population.		Proportionate mortality to 1,000 deaths all causes.	
	White.	Colored.	White.	Colored.	White.	Colored.
Annapolis.....	5,278	3,248	20.84	52.34	150	193
Baltimore	428,218	79,258	20.57	53.75	108	161



MORTALITY IN THE FIVE PRINCIPAL TOWNS OF MARYLAND FROM TUBERCULOSIS, 1903

The comparison of the white and colored proportionate mortalities in the State is given in the succeeding table for the three years 1900, 1901 and 1902.

The mean proportionate mortality for the three years is white, 108; colored, 187 per 1,000 deaths from all causes. The proportionate mortalities and the annual tubercular mortality per 10,000 of population are compared among the white and colored for the United States, Maryland and Baltimore for the census year 1900. The annual tubercular mortality for the United States was for every 1,000 of population, 13.09 among the white and 24.97 among the colored, while the proportionate mortality from tuberculosis for each 1,000 deaths was white, 98; colored, 150. These figures are considerably lower than the State figures given in the preceding table for 1900 notwithstanding the exclusion of the Baltimore figures which always give a high mortality.

The figures indicate that Baltimore and Maryland are subject to a much greater mortality from tubercular diseases than is the United States at large.

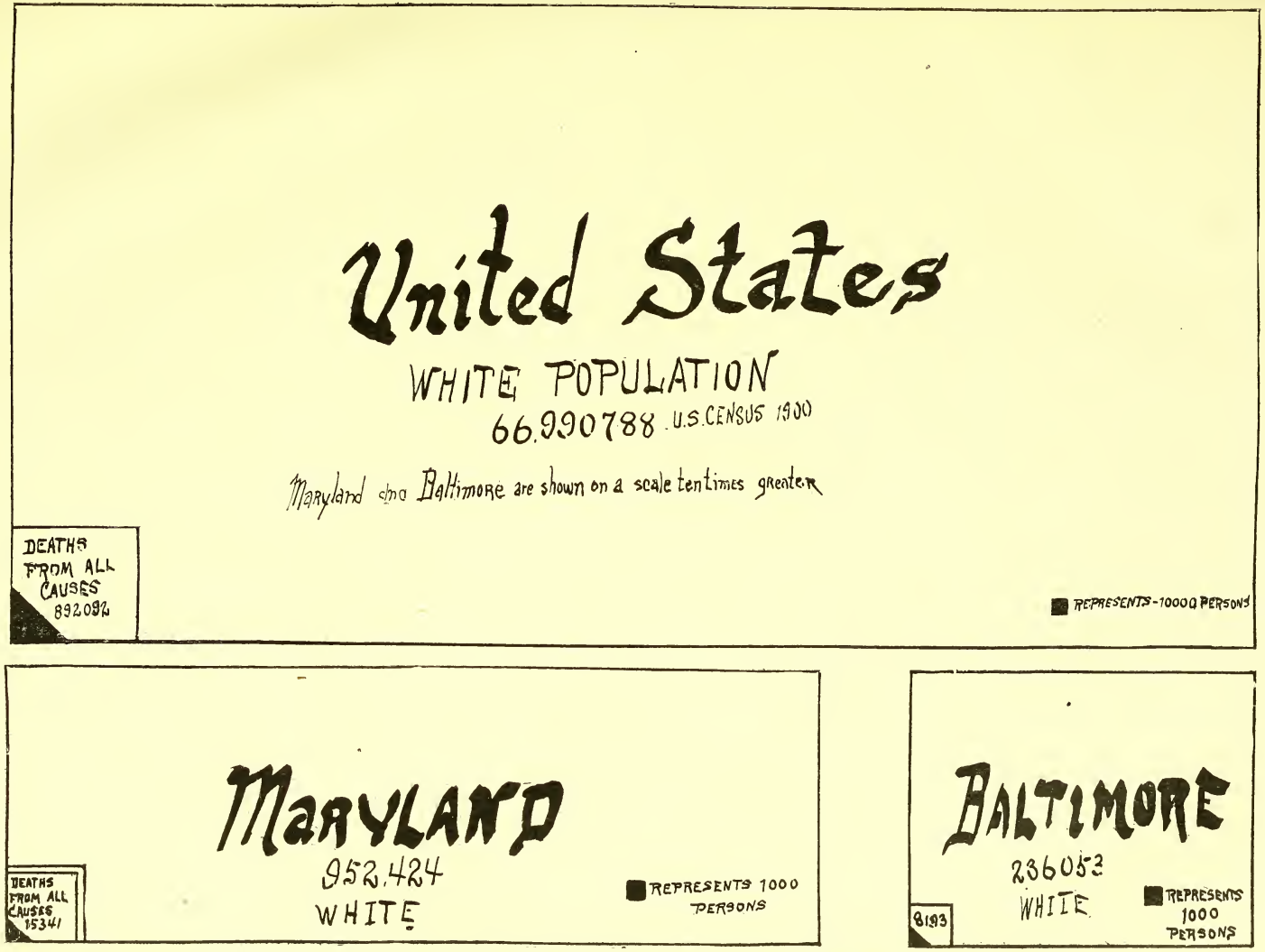
The absolute mortality, the annual death rate and proportionate mortality from tuberculosis for the three political divisions mentioned are shown graphically in the accompanying chart.

DEATHS IN MARYLAND EXCLUSIVE OF BALTIMORE.

	Tuberculosis.		All causes.		Ratio to total mortality per 1,000 deaths.	
	White.	Colored.	White.	Colored.	White	Colored.
1900.....	593	346	5,867	1,906	101	182
1901	664	496	6,169	2,594	107	191
1902.....	662	496	5,817	2,661	115	187

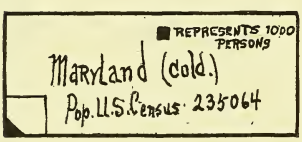
THE WHITE AND COLORED MORTALITY FROM TUBERCULAR DISEASES IN THE UNITED STATES, MARYLAND AND BALTIMORE FOR THE CENSUS YEAR 1900.

	Deaths, all causes.		Deaths, tuberculosis.		Ratio tuberculosis mortality per 10,000 of population.		Ratio tuberculosis to general mortality per 1000 deaths from all causes.	
	White	Colored	White	Colored	White	Colored	White	Col'd
United States..	892,092	147,002	87,673	22,077	13.09	24.97	98	150
Maryland	15,341	5,081	1,480	838	21.75	38.86	96	165
Baltimore City	8,193	2,486	764	357	17.84	45.04	93	152



BALTIMORE, MARYLAND, AND THE UNITED STATES, SHOWING TOTAL AND TUBERCULAR DEATHS FOR 1900

MARYLAND and BALTIMORE are shown on a scale ten times greater



COLORED POPULATION

BALTIMORE, MARYLAND, AND THE UNITED STATES, TOTAL DEATHS AND TUBERCULAR DEATHS FOR 1900

VARIETIES OF TUBERCULAR DISEASES.

An examination of the tubercular mortality in the city and State during 1903 shows the following organs to have been the seat of the fatal tuberculous infection.

CITY.

		Per Cent.
ORGANIC.		
Tuberculosis of the lungs and larynx	1,144	86.00
of the meninges	67	5.03
general miliary	66	5.00
of the peritoneum	21	1.58
abdominal and intestinal	17	1.28
solitary tubercle of the brain	1	.....
of the liver	1	.....
BONES.		0.67
Tuberculosis of vertebrae	4	.....
of hip joint	3	.....
of sacrum	1	.....
of atlas and axis	1	.....
SKIN AND LYMPHATIC GLANDS.		
Scrofula	3	.....
Lupus vulgaris	1	.....
	1,330	

STATE.

		Per Cent.
ORGANIC.		
1. Tuberculosis pulmonalis et laryngiditis	1,076	93 32
2. Tuberculosis meningitis	27	2.34
3. Tuberculosis disseminata	23	2.00
4. Tuberculosis intestinale et abdominalis	12	1.00
5. Tuberculosis peritoneal	5	.....
6. Tuberculosis hepaticum	2	.....
7. Morbus Addisonii	1	.....
DERMIC,		
Lupus vulgaris	1	.....
LYMPHOID.		
Scrofulosis	1	.....
OSSEOUS.		0.34
Tuberculosis vertebralae	3	.....
Tuberculosis tarsae	1	.....
Location not definite	1	.....
	1,133	

Laryngeal and pulmonary tuberculosis have not been separated in these tables as the conditions are practically identical. Not only is primary laryngeal tuberculosis extremely rare, but the fatal issue even in so-called primary laryngeal tuberculosis is mainly due to pulmonary disease.

The tables thus formed give in the city a proportion of 86 per cent. and in the State a proportion of 93.32 per cent. for tuberculosis of the respiratory organs as a factor in the tubercular mortality. Before accepting these figures it is proper to add general tuberculosis to the respiratory forms as the respiratory organs are practically always affected in the general form, and the disease is nearly always most advanced in the lungs.

The proportion then becomes 91.03 per cent. for the city and 96.66 per cent. for the State. It will be seen by reference to the tables that the difference in the ratios of the State and city mortalities from pulmonary tuberculosis is mainly caused by the greater proportion of deaths from the more acute and malignant forms of tuberculosis, especially general miliary and meningeal tuberculosis.

The latter yield each 5 per cent. of the tubercular mortality in the city and only 2 per cent. in the State. Peritoneal tuberculosis also plays a considerable part in the urban mortality. The greater mortality from the acute and general forms of tuberculosis is in accordance with the comparisons of the total State and city tubercular mortalities. The city mortality showed two deaths from unusual forms, one from solitary tubercle of the brain and one from tuberculosis of the axis and atlas, sudden death occurring from luxation in the latter case.

MORBIDITY STATISTICS OF MARYLAND, 1903.

No attempt has previously been made to determine the extent of tuberculosis in Maryland other than the general mortality returns for the State and city. While these figures give a fairly accurate idea of the extent of the most important and communicable form of tuberculosis, viz: Tuberculosis of the lungs, it does not give any estimate of extensive and important varieties of tuberculosis not usually fatal, but giving rise to ill health, disability, and often marked deformity. Among this latter class may be included the various forms of bone tuberculosis, tubercular adenitis, and scrofula. Tuberculosis causes, in fact, the largest part of the deformities known as hump back and hip disease and many other forms of lameness.

The number of persons suffering from tuberculosis during any given time can only be approximated for several reasons. Aside from the difficulty of obtaining complete reports of these cases, the marked differences in diagnosis lead to inaccurate con-

clusions. Among physicians not having convenient access to laboratories, diagnosis, especially in pulmonary cases, is frequently delayed until the development of the hectic and emaciation of the final stages of the disease. The importance of a definite diagnosis in the early stages is too obvious to require demonstration, as both the lives of the patient and those about him are dependent upon it. A considerable proportion of cases are actively infective long before the development of any very marked symptoms.

The work of the State and city laboratories has been very effective in giving physicians in Maryland the means of early diagnosis.

In collecting statistics of living tuberculous cases in Maryland two methods were employed. The first of these consisted in collecting data from schools, hospitals, asylums, homes and other institutions which furnished reports on blanks supplied by the Commission. The second method secured data from individual physicians of all cases under their care during the year 1903, beginning November 1, 1902, and ending November 1, 1903, by means of printed census blanks.

From the institutions in Baltimore city and a few State and private hospitals there were reported 856 cases of tuberculosis. The large majority of these were reported from the Johns Hopkins Hospital and the City Hospital at Bay View. Other institutions furnishing reports of cases were the City Hospital, University Hospital, Maryland General Hospital, St. Joseph's Hospital, City Medical Agency, Instructive Visiting Nurse Association, Charity Organization Society and Association for the Improvement of the Condition of the Poor, Consumptive Hospital at Towson, Maryland Homeopathic Hospital and the Hospital for Crippled Children. The dispensaries in the city reporting cases were the Northeastern, Eastern, Central, General Dispensaries and Baltimore Evening Dispensary. The State asylums each reported cases developing during the year. Notwithstanding the special liability of the insane to tuberculosis, the number of cases is diminishing in all the asylums. In the private institutions about Baltimore the number is very small. Arrangements are being made at the State asylums for the segregation and special treatment of the tuberculous insane. Dr. Clark, at the Springfield State Hospital, has been treating his cases by out-of-door tent life and a dietary regimen with considerable success, and a special building will probably be constructed next year for the accommodation of his tuberculous cases. It is no doubt due to the execu-

tion of these measures in some degree during the past decade that the fall in the mortality from phthisis in insane institutions is largely due, together with the regular light exercise in the open air which most of them enjoin. The same method of isolation and special treatment is badly needed in other insane hospitals in the State, notably Bay View Insane Department, where the number of tuberculous insane patients is very large. Conditions similar to Bay View require the immediate attention of the city and State authorities. It is manifestly impossible to prevent infection among the demented insane unless the tuberculous are isolated and specially treated.

A considerable number of seamen both from Maryland and distant points are treated at the United States Marine Hospital in Baltimore. As large a proportion as possible are sent to the United States Marine Hospital at Fort Stanton, New Mexico, for regular "closed sanatorium" treatment.

The highest mortality among institutions is that existing among the penal institutions. The Baltimore city jail and the Maryland penitentiary show in their annual mortality and morbidity reports the extent of tuberculosis within the walls of these institutions.

The mortality in the penitentiary is naturally much higher owing to the greater length of the sentence imposed. The average sentence imposed in the penitentiary is five and one-half years, the shortest possible term six months. Dr. Cooke, the physician to the penitentiary, estimates that 50 per cent. of the deaths in the institution are due to tuberculosis.

The following table shows the mortality among the white and colored for the State, city, city jail, and penitentiary in 1902:

MORTALITY PER 10,000 FROM TUBERCULOSIS, 1902.

	State.	City.	City Jail.	Maryland Penitentiary.
White.....	21.75	17.84	.....	23.90
Colored.....	38.86	45.04	56.30	156.80

Prison confinement appears to fall with especial severity on the colored race. The steady rise in the mortality from the country to the city and the sudden elevation among the penitentiary inmates to 156.80 per 10,000 annually is very striking. Of the

nine deaths occurring in the penitentiary in 1902 over 75 per cent. were due to acute miliary and meningeal tuberculosis.

		Per Cent.
Tubercular Meningitis	3	33.33
Miliary tuberculosis	4	44.44
Phthisis pulmonalis	1	11.11
Coxalgia	1	11.11

In the collection of the second class of morbidity statistics blanks were sent to over 2,000 physicians practising in the State. Negative as well as positive reports were requested. The blank contained the same data given on the smaller blank for institutional use. Five hundred and sixty-four physicians returned reports, 320 giving positive and 240 negative reports.

The estimation of the total number of living cases of tuberculosis in Maryland was made in two ways, both of which were founded on the death records. The average number of cases dying of tuberculosis in Maryland annually is somewhat over 2,000. The average term of life of each of these cases may be estimated at five years, an estimate giving one-fifth of all those sick dying in one year or 5x2,000=10,000 cases.

The second method depends on the estimate of the proportion of dead and living cases, from the comparative number of each class occurring in the private practice of physicians in Maryland.

Of the Maryland physicians reporting cases, 89 reported both dead and living cases. Of these there were living and dead the following proportion: Living, 561, 68 per cent.; dead, 260, 32 per cent., or 68 per cent. of reported cases were living.

The deaths from tuberculosis in the city in 1903 were 1,330; in the State 1,153, or a total number of deaths in the State of Maryland of 2,483. If this represents 32 per cent. of all the cases the total number of cases during one year will be 7,760, an estimate probably considerably lower than the real number as to this must be added those cases presenting no marked clinical symptoms and not under medical care. The correct number will probably average between *nine thousand* and *ten thousand* cases and more closely approximate the latter number.

The following tables give the per cent. of morbidity caused by disease of the several organs. On the accompanying charts are shown the roles played by the various tubercular diseases as causes of sickness on the one hand and death on the other.

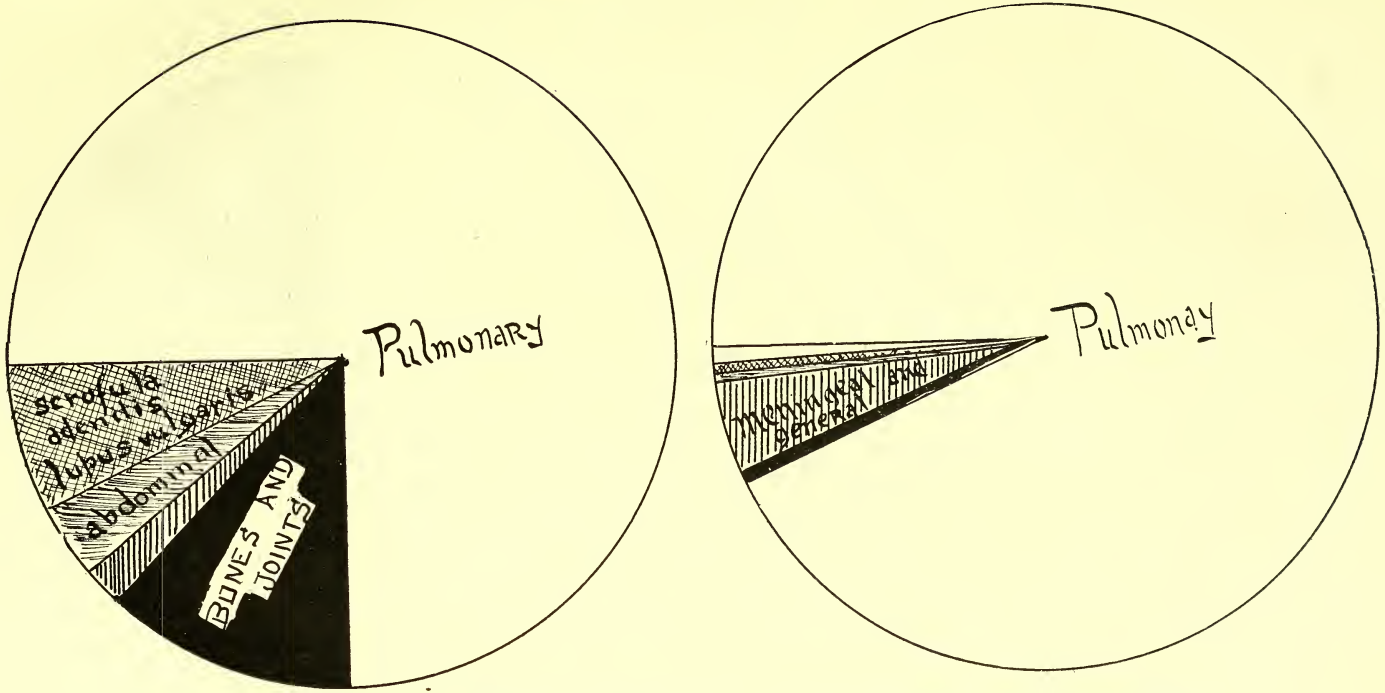
MORBIDITY STATISTICS, 1903.

City.

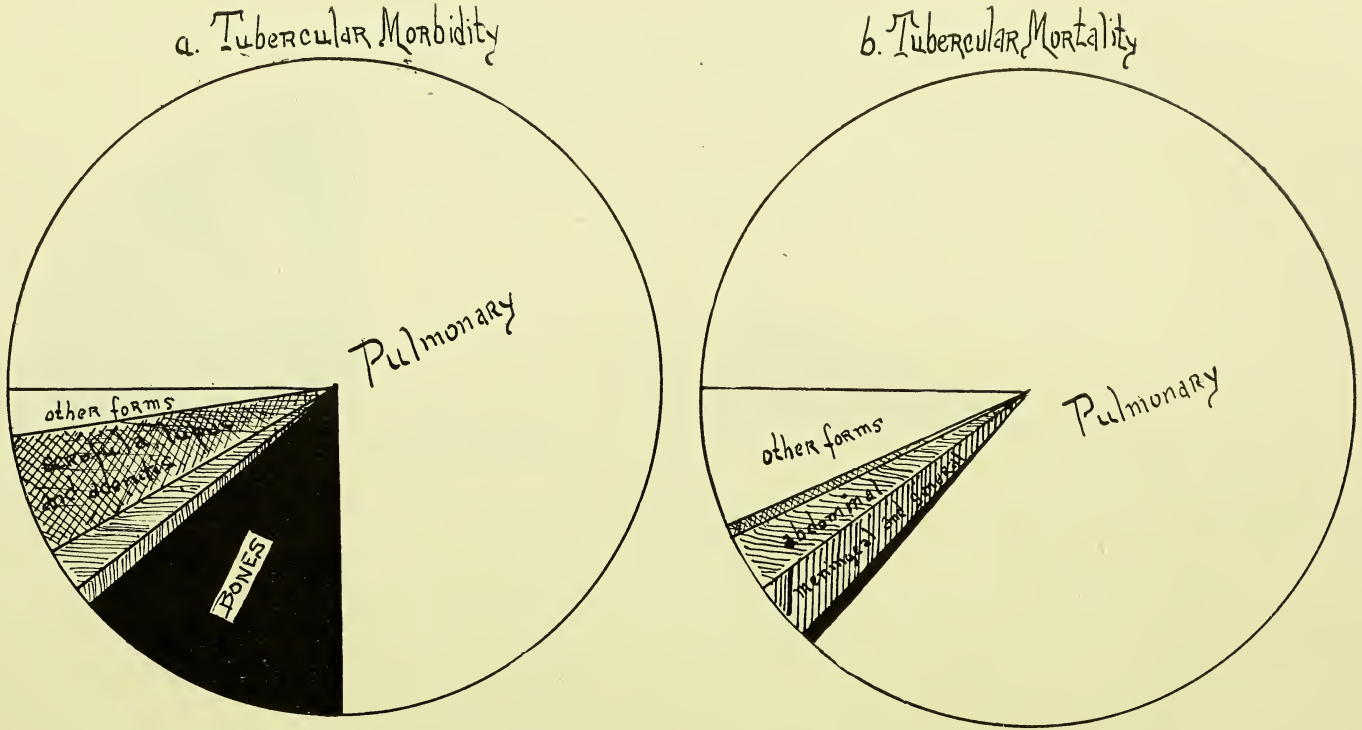
Organ.		Per Cent.	Per Cent.
Lungs and larynx	713	75.00	.....
Bones and joints	44	4.63	14.00
Pott's Disease	52	5.50	.....
Morbus Coxarius	22	2.31	.....
Tumor albus	7	.74	.....
Ankle	2	.20	.....
Sterno-clavicular	1	.....	.....
Skull	1	.....	.....
Elbow	1	.....	.....
Rib	3	.30	.....
Skin and lymphatic glands	34	3.57	.....
Scrofula	21	2.21	.....
Genito-urinary	15	1.57	.....
Abdominal and intestinal	13	1.36	.....
Peritoneal	10	1.05	.....
General miliary	5	.50	.....
Meninges	2	.20	.....
Abscess	2	.20	.....
Hepatic	1	.....	.....
Tubercular endometritis	1	.....	.....
	950		

State.

Organ.		Per Cent.	Per Cent.
Lungs and larynx	480	74.53	.....
Bones and joints	29	4.50	.....
Morbus Coxarius	18	2.80	.....
Pott's Disease	18	2.80	12.00
Tumor Albus	7	1.08	.....
Maxillary	1	.....	.....
Rib	1	.....	.....
Tendon sheath of arm	1	.....	.....
Skin and lymphatic glands	30	4.70	.....
Scrofula	22	3.42	.....
General miliary	9	1.30	.....
Abdominal and intestinal	10	1.55	.....
Peritoneal	7	1.08	.....
Genito-urinary	6	.96	.....
Appendiceal	1	.....	.....
Meninges	4	.62	.....
	644		



COMPARISON OF THE SEVERAL TUBERCULAR DISEASES. A—AS A CAUSE OF SICKNESS. B—AS A CAUSE OF DEATH.
MARYLAND (EXCLUSIVE OF BALTIMORE), 1903



COMPARISON OF THE SEVERAL TUBERCULAR DISEASES. A—AS A CAUSE OF SICKNESS. B—AS A CAUSE OF DEATH.
BALTIMORE CITY, 1903

The charts show the predominance of tuberculosis of the lungs as a cause of sickness as well as of death. The large role played by bone tuberculosis as a cause of sickness is in striking contrast to its small importance as a cause of death. Scrofula, tubercular adenitis, and lupus are prominent among morbidity statistics, while they are a negligible factor in the formation of the mortality statistics. Meningitis and acute general tuberculosis do not naturally play a prominent part as the cause of prolonged invalidism.

GENERAL TUBERCULOSIS.

The study of general tuberculosis possesses interest from both the pathological and prognostic standpoint. It appears to indicate either very bad hygiene or a low resisting power. It occurs most frequently among children, and those in confinement.

Together with the other acute forms it is strikingly less frequent in the country than in the city; the figures both for the general and disseminated forms showing a nearly three times greater frequence in the city, as is shown in the accompanying table:

GENERAL TUBERCULOSIS.

Table showing the development of general and disseminated tuberculosis among those dead of tuberculosis in Maryland in the year 1903.

	Deaths from Tuberculosis, 1903.	General Tuberculosis.	Per Cent.	Acute General Miliary Tuberculosis.	Per Cent.
City.....	1,313	65	4.95	25	1.91
State.....	1,158	22	1.90	8	0.68

A distinction has been made in this table between general tuberculosis and disseminated tuberculosis, as the former represents frequently an extension by contiguity or continuity rather than an extensive eruption of tubercles throughout the body, such as occurs in the acute general miliary form. (Under the Bertillion classification tuberculosis affecting two or more organs is classified as general tuberculosis.)

As the sputum is always swallowed in greater or less degree in tuberculosis of the lungs or larynx the development of a tuberculosis of the intestines, peritoneum, or mesentery represents in the large majority of cases an extension by contiguity rather than a systemic dissemination.

A meningeal tuberculosis in an adult following upon a localized organic lesion should on the other hand be considered a disseminated form.

The two succeeding tables show the great susceptibility of the young to tuberculosis. It is usually the case that tuberculosis appearing in an infant runs a rapid course with a tendency to become generalized. The two periods of greatest susceptibility

are marked by the frequency of dissemination, viz: From birth to 5 years and from 15 to 40 years, 82.7 per cent. of all cases of generalized tuberculosis fall within these periods. When all cases of tuberculosis resulting in death are analyzed, the prevalence of generalized tuberculosis in infants becomes much higher. In Baltimore city during 1903, of 104 fatal cases among infants, nearly one-fifth—20 or 19.23 per cent.—became generalized.

TABLES GIVING ANALYSIS OF GENERAL AND DISSEMINATED TUBERCULOSIS IN MARYLAND IN 1903.

According to age periods.

	†General tuberculosis.	Per Cent.
Five years and under	23	26.4
Fifteen to forty years	49	56.3
All other ages	15	17.2

Per cent of tuberculosis becoming disseminated at the 3 age periods.*

	All forms of tuberculosis.	General tuberculosis.	Per Cent.
Five years and under	104	20	19.23
Fifteen to forty years	707	34	4.81
All other ages	505	11	2.17

† Does not include tuberculosis appearing simultaneously in two contiguous organs.
* For Baltimore City only. Includes both white and colored mortalities.

The succeeding table gives the forms of tuberculosis most frequently becoming generalized. The number of pulmonary cases amounting to less than 1 per cent.

The highest rate given in the table is for coxalgia. All of the deaths resulting from coxalgia during 1903 were due to generalized tuberculosis, while one-quarter of the deaths resulting primarily from tumor albus were immediately due to disseminated tuberculosis.

TABLE SHOWING THE PERCENTAGE OF GENERALIZED TUBERCULOSIS DEVELOPING FROM TUBERCULOSIS OF THE SEVERAL ORGANS.

Form of Disease.	No. Living 1903.	No. Developing Gen'l Tuberc.	Per Cent. *
Tuberculosis pulmonalis et laryngiditis	1,144	10	0.87
meningiditis	67	.....	.....
peritoneal	21	.....	.....
intestinal et abdominalis	17	.....	.....
hepaticum	1	.....	.....
morbus Pottii	4	1	25.00
morbus coxarius	4	4	100.00
atlas et axis	1	.....	.....
sacræ	1	1	.....
tumor albus	.....	.....	.....
scrofulosis	3	2	66.00
lupus vulgaris	1	.....	.....
Organ not stated	.....	58	.....
Organ not stated combined with pul. tub	.....	.....	6.00

*The figures do not indicate actual percentage, but show the relative frequency of general tuberculosis following tuberculosis of the several organs—two sets of figures being used, viz: the mortality and morbidity statistics for 1903.

INFANTILE TUBERCULOSIS.

Tuberculosis among infants in Maryland forms a much greater factor in the tubercular mortality than is generally supposed.

This is particularly the case among colored infants, in whom the tubercular mortality under two years exceeds the general colored tubercular death rate in a very considerable degree. It is this portion of the mortality from tuberculosis which is most readily and certainly preventable, hence it assumes an importance in its vital interest to the State far in excess of the actual number of deaths which occur during this period of life.

In the following table the tubercular mortality among the white and colored is compared for three periods of life, viz.—0-2 years, 2-5 years, and for all ages. Of these three periods the lowest mortality for both white and colored is that from 2-5 years, which gives a white mortality of 8 and a colored mortality of 36.29 per 10,000 of each race living at this period. The colored death rate under 2 years reached 54.66 and exceeds the general colored tubercular death rate, which is only 38.45.

The varieties of tuberculosis causing deaths among infants are shown in the second table for the city and State. In this table there appears the marked prominence of general and meningeal tuberculosis as factors in the infantile mortality. In Baltimore during 1903 meningeal tuberculosis ranked above pulmonary tuberculosis as a cause of death among infants.

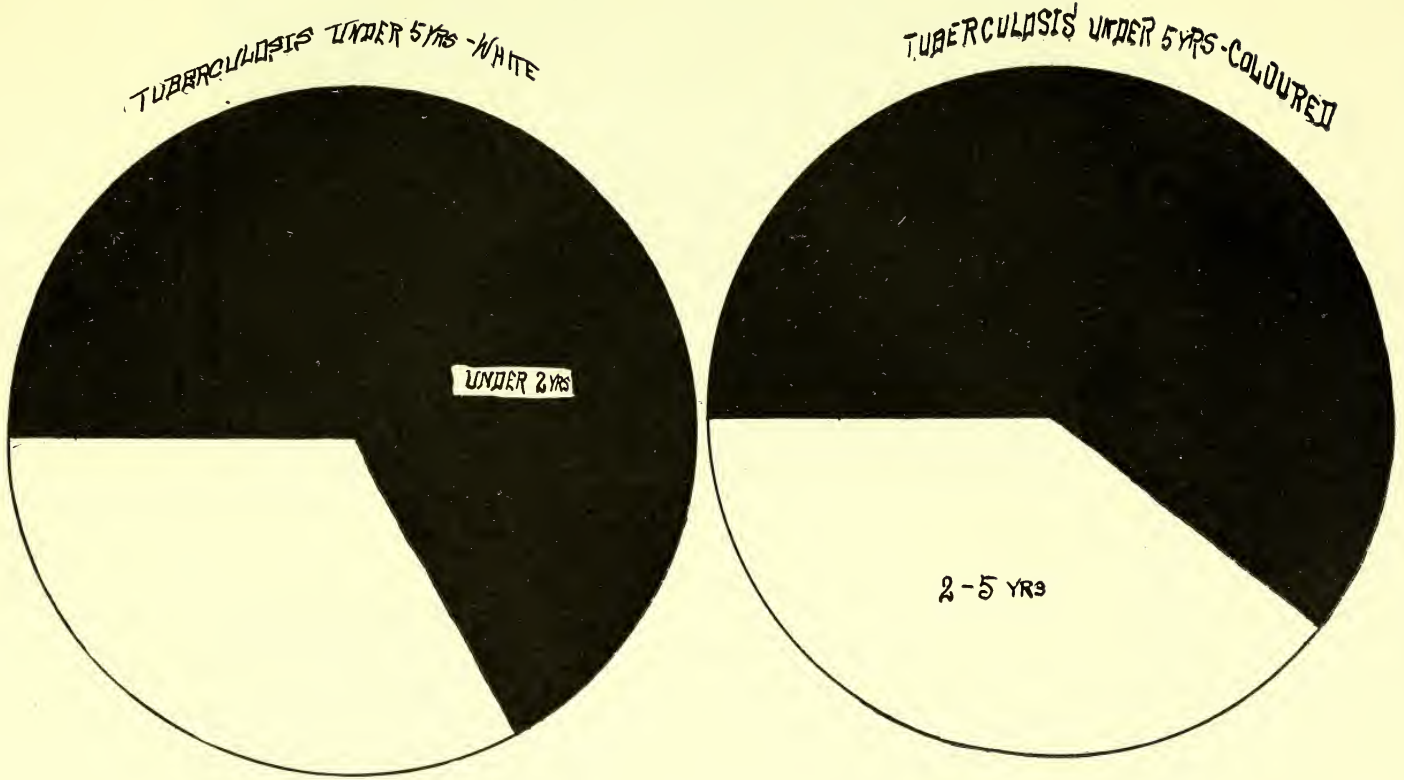
The larger part of this infantile mortality falls under two years when there is a high susceptibility to tuberculosis, a susceptibility reflected by the tables of general tuberculosis at this age period.

TUBERCULAR MORTALITY AMONG WHITE AND COLORED INFANTS IN MARYLAND, 1903.

	Estimated population.		Deaths from tuberculosis.		Death rate per 10,000.	
	White.	Colored.	White.	Colored.	White.	Colored.
Under 2 years .	44,686	11,526	56	63	12.53	54.66
Under 5 years .	110,109	28,931	88	105	8.00	36.29
All ages.....	952,424	235,620	1,566	905	16.44	38.45

TUBERCULAR INFANTILE MORTALITY IN BALTIMORE AND RURAL MARYLAND.

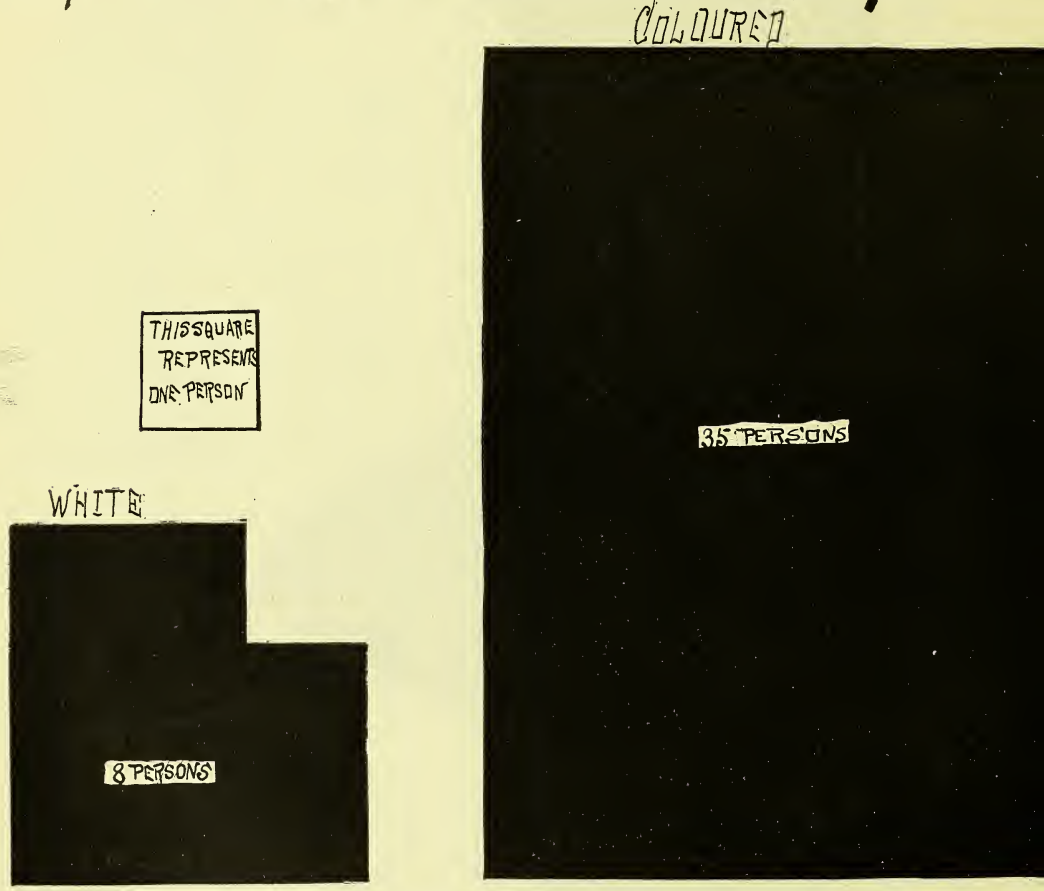
State.		Per Cent.
1. Pulmonary Tuberculosis..... ...	60	65.93
2. Meningeal Tuberculosis.....	22	24.17
3. General Tuberculosis.....	4	4.40
4. Intestinal Tuberculosis.....	2	2.09
5. Peritoneal Tuberculosis.....	1	1.10
6. Tuberculosis of Spine.....	1	1.10
7. Scrofula	1	1.10
Total for State.....	91	
Baltimore City.		**Per Cent.**
1. Meningeal Tuberculosis....	42	39.26
2. Pulmonary Tuberculosis.....	36	33.64
3. General Tuberculosis.....	17	16.00
4. Intestinal Tuberculosis.....	7	6.54
5. Peritoneal Tuberculosis.	2	1.87
6. Pott's Disease.....	1	.93
7. Coxalgia.....	1	.93
8. Solitary Tubercle of brain.....	1	.93
Total for Baltimore City.....	107	



PERCENTAGE OF INFANTILE TUBERCULOSIS UNDER TWO YEARS.

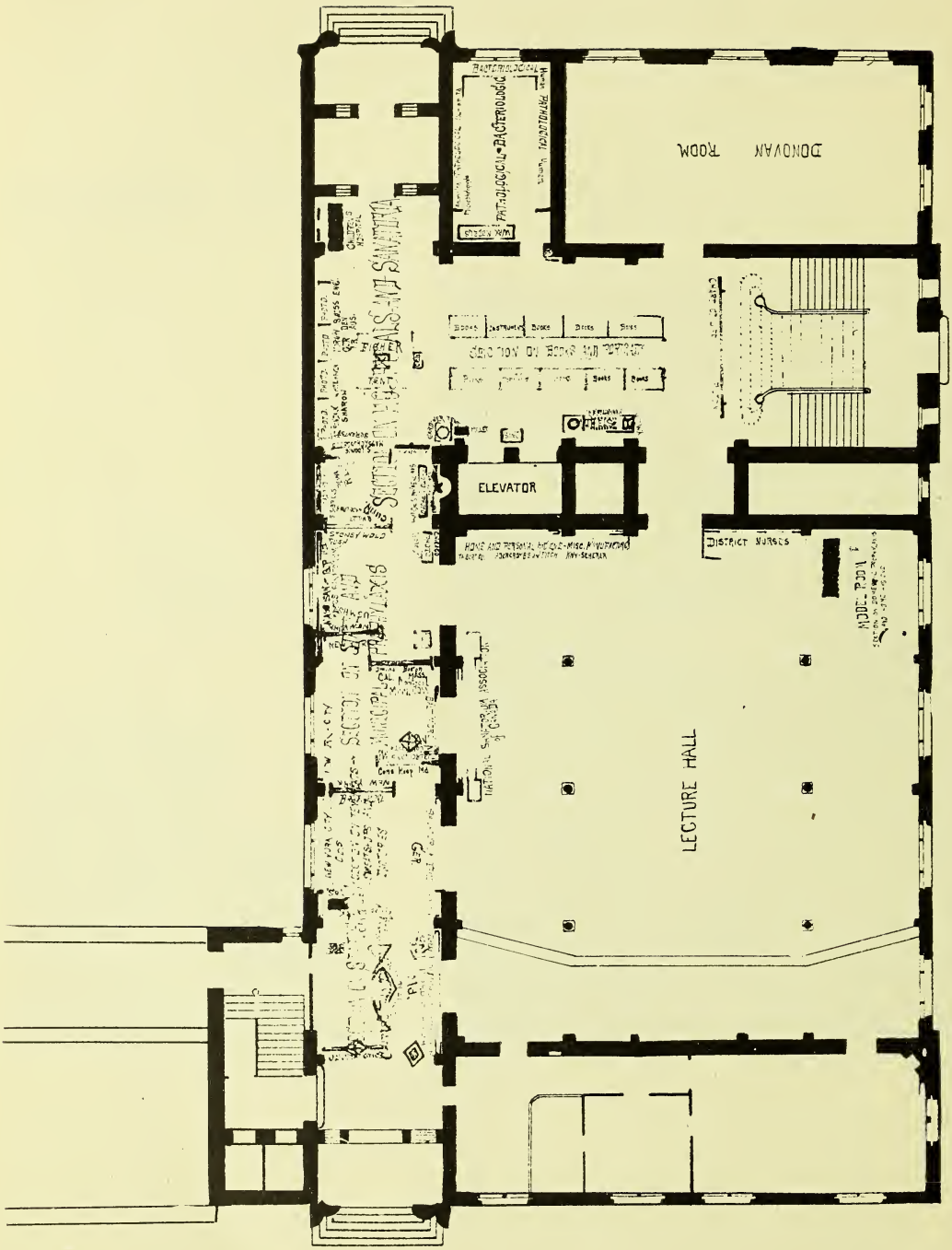
MARYLAND, 1903

Infantile Tubercular Mortality



NUMBER OF DEATHS, WHITE AND COLOURED—UNDER FIVE YEARS OF AGE—AMONG EACH TEN THOUSAND LIVING OF EACH RACE IN 1903

REPORT OF THE TUBERCULOSIS EXPOSITION



TUBERCULOSIS EXHIBITION. FLOOR PLAN. — MCCOY HALL, J. H. U., BALTIMORE. JANUARY 15, 1904.

PART III

REPORT ON THE TUBERCULOSIS EXPOSITION

The Honorable Tuberculosis Commission of Maryland,
Dr. William S. Thayer, President.

SIR: I have the honor to submit for your consideration a report on the Tuberculosis Exposition held in Baltimore during the week of January 15, 1904, by a committee of citizens under the auspices of the Tuberculosis Commission of Maryland with the State Board of Health of Maryland and the Maryland Public Health Association.

In accordance with instructions received in July, 1903, I endeavored to lay the foundations for the Exposition during a tour of inspection made by direction of the Commission, among the cities of New York, Boston and Philadelphia and the States of New York, Massachusetts and Pennsylvania in that month. In this endeavor I have had the invaluable advice and counsel of the Secretary of the State Board of Health.

The endeavor has been made to conform as fully as possible to the desire of the Commission that the Exposition should be the means of popular education to the people of Maryland is the simple and practical means of restriction and control of tuberculosis as well as a source of instruction to those already afflicted.

I am pleased to report my belief that those objects have on the whole been accomplished. Any results effected by the Exposition are due to the public-spirited citizens forming the large general committee having the Exposition in charge.

The original executive committee appointed by the Commission, which met in September of 1903, consisted of four representatives from the three organizations concerned.

From the Tuberculosis Commission—Dr. William S. Thayer, John M. Glenn, Esq., and Dr. Marshall L. Price.

From the Maryland Public Health Association—Dr. John S. Fulton and Dr. Price.

From the State Board of Health—Dr. Fulton.

The committee at its first meeting, on motion of Dr. Thayer, requested Dr. Henry Barton Jacobs, of Baltimore, to assume its chairmanship. The committee then organized and selected 181 additional persons to form the General Committee of the Exposition. At a meeting of the General Committee called in December, Dr. Jacobs was elected chairman; Dr. Fulton, secretary, and William H. Buckler, Esq., treasurer. The chairmen of the General Committee and chairmen of the sub-committees then appointed 32 additional members to the executive committee bringing their total membership up to 37.

The following program was submitted to the Committee on Decorations and Arrangements and adopted. Lists of the general and sub-committees are included as well as the program for each day.

PROGRAM.

OPENING EXERCISES, MONDAY, JANUARY 25th, 8.15 P. M.

DR. WILLIAM S. THAYER, Presiding.

The Exposition formally opened by.....His Excellency EDWIN WARFIELD, Governor of Maryland.

Address.....Hon. ROBERT MCLANE, Mayor of Baltimore.

Address.....DR. WM. OSLER, Baltimore.

Address....."The Statistical Laws of Tuberculosis," MR. FREDERICK HOFFMAN, of Newark, N. J.

(From the conclusion of these exercises until eleven o'clock the Exposition will be open.)

TUESDAY, JANUARY 26th.

10 A. M.—Exposition opens.

5 P. M.—Address by.....DR. LAWRENCE F. FLICK, of Philadelphia, "House Infection of Tuberculosis."

10 P. M.—Exposition closes.

The exhibits will be demonstrated daily between the hours of 10 and 12, 3 and 6, 8 and 10. Tours of observation will not be allowed while lectures are in progress.

Demonstration in the exhibit of pathology will be made daily between the hours of 2 and 6 P. M.

WEDNESDAY, JANUARY 27th.

10 A. M.—Exposition opens.
8.15 P. M.—Address by.....Dr. Mazyck P. Ravenel, of Philadelphia,
"Bovine Tuberculosis, a Factor in Human Tuberculosis."
Address by.....Dr. D. E. Salmon, of Washington,
"Some Observations on the Tuberculosis of Animals."
10.30 P. M.—Exposition closes.

THURSDAY, JANUARY 28th.

10 A. M.—Exposition opens.
8.15 P. M.—Address by.....Dr. S. A. Knopf, of New York.
"Pulmonary Consumption and the Possibilities of Its Eradiction Through the Combined Action of a Wise Government, Well Trained Physicians, and an Intelligent People."
10 P. M.—Exposition closes.

FRIDAY, JANUARY 29th.

10 A. M.—Exposition opens.
8.15 P. M.—Address by.....Dr. George J. Adami, of Montreal.
"Facts, Half-truths, and the Truth, About Tuberculosis."
10.30 P. M.—Exposition closes.

SATURDAY, JANUARY 30th.

10 A. M.—Exposition opens.
5 P. M.—Lantern Demonstration by
Dr. William H. Welch and Dr. Charles H. Potter.
8.15 P. M.—Lantern Talk by.....Dr. John B. Huber, of New York.
10 P. M.—Exposition closed.

TUBERCULOSIS COMMISSION OF MARYLAND.

Dr. William S. Thayer, *President.*
George Stewart Brown,
Dr. W. Frank Hines,
Dr. Lilian Welsh,
John M. Glenn, *Secretary,*
Dr. Marshall Langton Price, *Medical Officer.*

STATE BOARD OF HEALTH OF MARYLAND.

Dr. William H. Welch, *President,*
Dr. Howard Bratton,
Mr. J. B. Noel Wyatt,
Dr. E. J. Dirickson,
Dr. James Bosley,
Hon. Wm. Sheppard Bryan,
John S. Fulton, M. D., *Secretary.*

MARYLAND PUBLIC HEALTH ASSOCIATION.

PRESIDENT.

Dr. T. B. Owings, Ellicott City.

VICE-PRESIDENT.

Dr. Roger Brooke, Sandy Spring.
Dr. F. H. Thompson, Annapolis.
Dr. C. R. Scheller, Hagerstown.
Dr. E. J. Dirickson, Berlin.
Dr. Charles O'Donovan, Baltimore.

TREASURER.

Dr. Wm. Royal Stokes, City Hall Annex, Baltimore.

SECRETARIES.

Dr. John S. Fulton, Baltimore.
Dr. Marshall Langton Price, Baltimore.

EXECUTIVE COMMITTEE.

Dr. Henry Barton Jacobs, *Chairman.*
Dr. John S. Fulton, *Secretary.*
Mr. Wm. H. Buckler, *Treasurer.*
Mrs. John J. Abel,
Dr. H. Warren Buckler,
Mr. Jeffrey Brackett,
Dr. W. W. Ford,
Dr. Samuel J. Fort,
Mr. Fabian Franklin,
Dr. Joseph E. Gichner,
Mr. John M. Glenn,
Mrs. John M. Glenn,
Mr. Nat. G. Grasty,
Dr. Louis F. Hamman,
Mr. Charles Morris Howard,
Dr. C. Hampson Jones,
Dr. J. H. Mason Knox,
Dr. David Lyman,
Dr. Harry B. Marshall,
Dr. Charles W. Mitchell,
Dr. Standish McCleary,
Dr. W. G. MacCallum,
Miss Adelaide Nutting,
Dr. William Osler,
Dr. Charles H. Potter,
Rev. Arthur C. Powell,
Dr. Marshall Langton Price,
Dr. John Ruhrah,
Dr. Mary Sherwood,
Dr. Wm. Royal Stokes,
Dr. John B. Schwatka,
Dr. Wm. S. Thayer,
Dr. W. Dulany Thomas,
Miss Reba Thelin,
Dr. Lilian Welsh,
Dr. Wm. H. Welch,
Mr. J. B. Noel Wyatt.

AUXILIARY COMMITTEE.

Abel, Mrs. John J.,
Ames, Mr. Joseph S.,
Atkinson, Dr. I. E.,
Baughman, Mr. L. Victor,
Berkley, Dr. Henry J.,
Birnie, Dr. C., (Taneytown),
Bispham, Dr. William N.,
Blake, Dr. John D.,
Bonaparte, Mr. Charles J.,
Bonaparte, Mrs. Charles J.,
Bonsal, Mr. Leigh,
Booth, Gen. A. E.,
Bosley, Dr. James,
Bowdoin, Mrs. Wm. Graham,
Brackett, Mr., Jeffrey R.,
Bratton, Dr. Howard (Elkton),
Brauns, Mr. Henry,
Brewington, Hon. M. V.,
Brown, Dr. Thomas R.,
Brown, Mr. Alexander,
Brown, Mrs. Alexander,
Brown, Mr. George Stewart,
Bruce, Mr. Wm. Cabell,
Bruce, Mrs. Wm. Cabell,
Brulle, Dr. Hermann,
Brush, Dr. Edward N., (Towson),
Buckler, Dr. H. Warren,
Buckler, Mr. W. H.,
Buckler, Mrs. Wm. H.,
Cary, Mr. John R.,
Carpenter, Dr. Francis A.,
Carroll, Mr. David H.,
Carroll, Miss Elizabeth N.,
Carter, Dr. Henry R.,
Chambers, Dr. John W.,
Clarke, Dr. J. C., (Sykesville),
Clark, Mr. Wm. Bullock,
Cohen, Mr. Mendes,
Cook, Mrs. George H.,
Cordell, Dr. Eugene F.,
Corkran, Mrs. Benjamin W.,
Dixon, Mr. William T.,
Earle, Dr. Samuel T.,
Eaton, Miss Mary N.,
Eccleston, Rev. J. H.,
Ellicott, Mrs. Wm. H.,
Ellis, Dr. C. M., (Elkton),
Ellis, Dr. R. H. P.,
Fisher, Mr. Charles D.,
Ford, Dr. W. W.,
Fort, Dr. Samuel J., (Ellicott City),
Franklin, Mr. Fabian,
Friedenwald, Dr. Harry,
Fulton, Dr. John S.,
Gail, Mr. George W.,
Gaither, Mr. George R., Jr.,
Gambel, Mrs. Thomas B.,
Garrett, Mr. Robert,
Gary, Mr. James A.,
Gibbons, Cardinal,
Gichner, Dr. Joseph E.,
Gilman, Dr. Daniel C.,
Gilman, Miss Alice,
Gilpin, Mrs. Henry B.,
Glenn, Mr. John M.,
Glenn, Mrs. John M.,
Glenn, Mrs. William,
Goldsborough, Dr. Brice W.,
Gordon, Mr. Douglas H.,
Gorsuch, Dr. J. F. H., (Fork),
Goucher, Pres. John F.,
Grasty, Mr. Nat. G.,
Griffiss, Mrs. John L.,
Guttmacher, Rev. A.,
Halsted, Dr. William S.,
Hamburger, Dr. Louis P.,
Hamman, Dr. Louis,
Harlan, Judge N. D.,
Hering, Dr. J. W., (Westminster),
Hines, Dr. W. Frank, (Chestertown),
Hollander, Mr. Jacob H.,
Hopper, Mr. Daniel W.,
Hooper, Mr. Theodore,
Howard, Mr. Charles Morris,
Humrichouse, Dr. J. W.,
Hurd, Dr. Henry M.,
Jacobs, Dr. Henry Barton,
Jacobs, Mrs. Henry Barton,
Jencks, Mr. Francis M.,
Johnston, Mrs. Josiah L.,
Jones, Dr. C. Hampson,
Jones, Hon. Spencer C.,
Kelly, Dr. Howard A.,
Keyser, Mr. William,
Knox, Dr. J. H. Mason, Jr.,
Lanahan, Mrs. Charles N.,
Latimer, Dr. Thomas S.,
Lazarus, Mrs. E. M.,
Lent, Miss M. E.,
Levering, Mr. Eugene,
Marburg, Mr. Theodore,
Marshall, Dr. Harry T.,
McComas, Hon. Louis E.,
McLane, Mayor Robert M.,
McLane, Miss Kate,
Miller, Miss Amy T.,
Miller, Mrs. Daniel,
Mitchell, Dr. Charles W.,
Morgan, Mr. Evan,
Morriss, Mr. William H.,
Murdock, Miss Esther,
Murray, Mr. Oscar G.,
Newcomer, Mr. Waldo,
North, Miss L. V.,
Nutting, Miss Adelaide,
O'Donovan, Dr. Charles,
Osler, Dr. William,
Osler, Mrs. William,
Owings, Dr. T. B., (Ellicott City),
Paret, Bishop,
Paton, Dr. Stewart,

AUXILIARY COMMITTEE—*Continued.*

Paton, Mrs. Stewart,
Perkins, Mr. Elisha H.,
Platt, Dr. Walter B.,
Pleasants, Dr. J. Hall,
Potter, Dr. Charles F. H.,
Powell, Rev. A. C.,
Pratt, Mrs. Enoch,
Price, Dr. Marshall L.,
Randall, Mr. Blanchard,
Reed, Mrs. William,
Reeves, Miss Ella T.,
Remsen, President Ira,
Smith, Dr. William H. .
Stabler, Dr. A., (Brighton),
Stokes, Dr. Wm. Royal,
Reynolds, Dr. George B.,
Reynolds, Miss May,
Ridgely, Miss Eliza,
Riggs, Gen. Lawrason,
Rowland, Dr. J. M. H.,
Ruhrah, Dr. John,
Sabin, Dr. Florence R.,
Schwatka, Dr. John B.,
Scott, Dr. J. Mc P., (Hagerstown),
Sellman, Dr. Wm. A. D.,
Shaw, Mr. John K.,
Sherwood, Dr. Mary,
Shryock, Gen. Thomas J.,
Sioussat, Mrs. Albert L.,
Smith, Dr. Franklin B.,
Stone, Rev. John T.,
Szold, Miss Henrietta,
Taylor, Mrs. Katherine A.,
Taylor, Dr. R. Tunstall,
Thayer, Dr. Wm. S.,
Thom, Mr. DeCourcy W.,
Thom, Mrs. J. Pembroke,
Thomas, Dr. Henry M.,
Thomas, Dr. Richard H.,
Thomas, Dr. W. Dulany,
Tiffany, Dr. L. McLane,
Todd, Dr. W. J.,
Trimble, Dr. Isaac R.,
Trippe, Mr. Andrew C.,
Trippe, Mrs. Andrew C.,
Tyson, Mrs. Jesse,
Ufford, Mr. Walter S.,
Venable, Major Richard M.,
Wade, Dr. J. Percy,
Walter, Mr. Moses R.,
Walters, Mr. Henry,
Weber, Mr. Charles, Jr.,
Welch, Dr. William H.,
Welsh, Dr. Lilian,
Wheeler, Mr. James R.,
White, Mr. Francis,
White, Mr. Julian LeRoy,
Whitridge, Dr. William,
Wickes, Mr. Joseph L.,
Wilkins, Mr. George C.,
Williams, Hon. Stevenson A.,
Wilson, Dr. Robert T.,
Winslow, Dr. Randolph,
Wyatt, Mr. J. B. Noel,
Zinkhan, Mr. Louis F.,

SUB-COMMITTEES.

WAYS AND MEANS.

Mr. Charles M. Howard, *Chairman.*
Mr. Wm. Buckler, *Treasurer.*
Dr. John B. Schwatka, Mr. John M. Glenn.

DECORATIONS AND ARRANGEMENTS.

Dr. John S. Fulton, *Chairman.*
Mr. J. B. Noel Wyatt, Dr. Charles W. Mitchell,
Dr. Joseph E. Gichner, Dr. W. Dulany Thomas,
Dr. Henry Barton Jacobs.

PATHOLOGICAL ANATOMY AND BACTERIOLOGY.

Dr. W. G. MacCallum, *Chairman.*
Dr. Wm. H. Welch, Dr. W. W. Ford,
Dr. Wm. Royal Stokes, Dr. Harry B. Marshall,
Dr. Charles H. Potter, Dr. Josè L. Hirsh,
Dr. Marshall L. Price.

PRESS AND PUBLICITY.

Mr. Nat. G. Grasty, *Chairman.*
Dr. Standish McCleary, Dr. Samuel J. Fort,
Mr. Fabian Franklin.

HOME TREATMENT AND HOUSE HYGIENE.

Dr. Lilian Welsh, *Chairman,*
Dr. Mary Sherwood, Mrs. John J. Abel,
Miss Adelaide Nutting, Dr. William Osler.

STATE AND MUNICIPAL PROPHYLAXIS.

Dr. John Ruhräh, *Chairman.*
Dr. C. Hampson Jones. Dr. Wm. Royal Stokes.

TENEMENTS, SWEATSHOPS AND FACTORIES.

Mr. John M. Glenn, *Chairman.*
Mrs. John M. Glenn, Mr. Jeffrey R. Brackett,
Rev. Arthur C. Powell, Mr. Nat. G. Grasty,
Dr. Joseph E. Gichner.

BOOKS AND PORTRAITS.

Dr. Wm. Osler, *Chairman.*
Dr. David Lyman, Dr. Louis F. Hamman,
Dr. Henry Barton Jacobs.

SPEAKERS.

Dr. Wm. Osler, *Chairman.*
Dr. William S. Thayer.

HOSPITALS AND SANITORIA.

Dr. H. Warren Buckler, *Chairman.*
Dr. Henry Barton Jacobs.

CHARTS AND DIAGRAMS.

Dr. John S. Fulton, *Chairman.*
Dr. Marshall L. Price.

HOUSE TO HOUSE VISITORS.

Miss Adelaide Nutting, Miss Rebà Thelin.

The exhibits were finally placed Monday afternoon and Monday night the Exposition was formally opened by His Excellency the Governor.

A report on the proceedings of the Exposition and a brief summary of the exhibits and demonstrations is herewith presented.

Respectfully submitted,

MARSHALL LANGTON PRICE,
Medical Officer.

REPORT ON EXHIBITS AND DEMONSTRATIONS OF THE EXPOSITION.

The use of McCoy Hall was kindly given by the trustees for the placing of the exhibits. All of the first floor was used for that purpose with the exception of the south end facing on Little Ross street, in which the office of the president, the directors' room and the registrar's office were located.

The central part of this space was occupied by the Assembly Hall containing a stage and seats for several hundred people. The back end and parts of the sides of the hall were reserved for exhibits. On the west and north side of the Assembly Hall ran the long hall and corridor, the floor and wall spaces of which were devoted entirely to exhibits.

A room used for faculty meetings, opening into the north side of the corridor, contained the pathological and bacteriological exhibits.

The exhibits were assigned to seven sections and were placed by the several sub-committees in charge, viz: Section on pathological anatomy and bacteriology; section on domestic and personal hygiene and prophylaxis; section on State and municipal prophylaxis; section on tenements, sweatshops and factories; section on books and portraits; section on hospitals and sanatoria; section on charts and diagrams; section on district nursing. The manufacturing exhibits were distributed by the Committee on Arrangements among the appropriate sections.

The exhibits were arranged in logical order of place and sequence so as to facilitate their inspection by those interested and their demonstration to sections and classes.

The main entrance was at the south end of the corridor from Little Ross street, where a large space was devoted to the statistics of tuberculosis demonstrated by means of charts and diagrams.

The sections in the logical order of their arrangement were placed as follows, beginning at the Little Ross street entrance:

1. Section on statistics of tuberculosis. (Charts and diagrams.)
2. Section on tenements, sweatshops and factories.
3. Section on State and municipal prophylaxis.
4. Section on hospitals and sanatoria.
5. Section on books and portraits.

Within the lecture hall:—

6. Section on domestic prophylaxis and house hygiene. (Model room, clothing, etc.)

7. Section on district nursing.

8. Manufacturing exhibits.

9. Exhibit of the National Sanatorium Association of Canada.

Pathological—Anatomical Room:—

10. Pathological anatomy, bacteriology, photomicrography. (Pathological models.)

SECTION ON STATISTICS OF TUBERCULOSIS.

The statistics of tuberculosis were illustrated by the charts and diagrams of the Tuberculosis Commission, the State Board of Health and the Prudential Life Insurance Company. The prevalence of tuberculosis in the United States and its gradual decline were illustrated by means of a series of charts. The exhibit of the Tuberculosis Commission illustrated tuberculosis in the State of Maryland, particularly from the economic point of view to show its economic influence on the State and community at large.

The following series of charts constituted the statistical exhibit of the Commission.

Chart No. 20.

Chart to show the mode of death of consumptives. (Statistics for Baltimore city, 1903.)

Upon a large circle are laid off by means of appropriate sectors in colors the immediate cause of death of consumptives dying in Baltimore city during 1903. The causes noted upon the chart are in order of their importance—asthenia, hemorrhage, pneumonia, acute nephritis and uræmia, peritonitis, other causes.

Chart No. 21.

Chart indicating the part played by tuberculosis in the mortality from diseases of the several organs. The eight causes of mortality are noted by means of the same number of circles upon which the tubercular mortality is laid down by black sectors in proper proportion. The diseases noted are: Diseases of the lungs and larynx, diseases of the intestines, and peritoneum, diseases of the brain and meninges, diseases of the bones, diseases of the lymphatic glands diseases of all other organs, generalized

infections (general disseminated miliary tuberculosis, septicæmia and pyæmia) lungs and larynx after five years of age.

The chart indicates that of the fatal diseases of the lungs and larynx, tuberculosis causes more than one-half the mortality; of diseases of the bones, one-half; of diseases of the lymphatic glands, over one-half; of generalized infections, about one-third. It plays relatively a small part in the fatal diseases of the brain and meninges, intestines and peritoneum, and of all other organs.

Chart No. 22.

Chart showing the average age of death and the duration of tubercular diseases for the State of Maryland, Baltimore city and for the extra urban portion of Maryland. The chart represents by means of columns of red fluid in graduated tubes (a) the average age of onset of tuberculosis (b) the average age of death for the city, in the rural districts and the State at large. The chart indicates the longer duration of the disease and the more advanced average age at death of tuberculous persons living in the country districts.

Chart No. 23.

Chart indicating the seasonal prevalence of tuberculosis, pneumonia and influenza by means of the monthly mortality returns for Baltimore city for the three years, 1901, 1902 and 1903.

The influence of pneumonia and influenza on the tubercular mortality is indicated. Three curves are shown, the black for tuberculosis, red for pneumonia and blue for influenza. Each of the ordinates indicates the number of persons decedent for each month in Baltimore city of the diseases specified.

The curve of tuberculosis corresponds closely with that of pneumonia and influenza and shows the influence of the latter diseases on the tubercular mortality.

Chart No. 24.

Chart constructed on the same plan as Chart No. 23 to show the influence of pneumonia and influenza on the tubercular mortality in the rural districts of Maryland during the year 1903.

Chart No. 25.

Chart to show the relative benignancy of tuberculosis in the aged. The chart indicates the duration in months for tuberculosis among those dying in each decennial period from 0 to 80 years and over.

The longer duration of the disease among those advanced in years is indicated by the steady rise in the curve.

Chart No. 26.

Chart to show the influence of yearly expenditure on the duration of tuberculosis. The duration is indicated by the curve for the amounts expended annually, viz:

Less than $ 250	a year
250–$ 500	"
500– 1000	"
1000– 1500	"
1500– 1750	"
1750– 2000	"
2000– 3000	"
3000 and over	"

Chart No. 27.

Economic chart comparing the life capital accumulated by male consumptives dying in Maryland during 1903 with the life capital accumulated by males dying of chronic diseases of the kidneys during the same period. Two black rectangles at the top of the chart indicate by their length the duration of the working period and the period of disability for each class of decedents and by the area the life capital accumulated.

The working period for healthy males is calculated on the assumed period of from 18 to 60 years. Two colored curves below indicate the average curve of daily wages for each class of decedents.

Charts 28 to 34 indicate the life-working period and daily wages of consumptive wage earners.

Chart No. 28.

Chart indicating the average working period of 12 males decedent in 1903, among whom there was no period of partial disability, also the average curve of daily wages for the same period The maximum daily wages is shown for one case. The working period is represented by a horizontal column, at one end of which is indicated the period of complete disability (in years.) On a portion of the chart below are indicated the average daily and maximum curves of wages for the working period. The top portion of the chart is graduated from one year to 24 years and the portion indicating the daily wages is graduated from 50 cents to $6.

Chart No. 29.

Economic chart indicating in the same manner the average working period of 69 wage-earning males decedent in 1903 showing also three periods, a period of full working capacity, a period

of partial disability, and a period of complete disability. The average and maximum curves of wages are shown for three periods.

Chart No. 30.

Economic chart indicating in the same manner the average working period of 15 wage-earning males surviving at the end of 1903, but totally disabled. The curve of average daily wages is shown for the same periods.

Chart No. 31.

Chart showing the average working period of eight wage-earning females decedent in 1903 showing the periods of partial and complete disability. The curve of average wages is shown below for the same periods.

Chart No. 32.

Economic chart showing the average working period of 53 females decedent in 1903, in whom disability was never partial. The terminal period of complete disability shows also the average wages for the working period, also the curve of maximum wages.

Chart No. 33.

Economic chart showing in the same manner the average working period of six females surviving with tuberculosis at the end of 1903, but completely disabled. There is no period of partial disability among these cases. The curve of average wages is shown for the working period.

Charts Nos. 34, 35, 36 and 37 show the individual economic course in four classes of cases reported by institutions and societies, namely Bay View Asylum (municipal hospital of Baltimore) Charity Organization Society and Association for Improving the Condition of the Poor, Johns Hopkins Hospital and the Instructive Visiting Nurse Association.

Chart No. 34.

Chart showing the individual economic course of fifteen cases reported by the Johns Hopkins Hospital terminating fatally. Each chart is divided by transverse bands into four zones, an uncolored zone of health at the top, a yellow band indicating a zone of partial disability, a pink band indicating the zone of complete disability and a black band indicating a fatal issue. The course of each case is traced through each zone. The vertical lines indicate the duration of the case in each zone.

Chart No. 35.

Economic chart indicating in the same manner the individual course of fourteen cases reported by the Instructive Visiting Nurse Association, nine of which terminated fatally.

Chart No. 36.

Economic chart indicating in the same manner the individual economic course for twenty-seven males reported by the Charity Organization Society and the Association for Improving the Condition of the Poor among wage earners under their care, fifteen of which proved fatal.

Chart No. 37.

Economic chart indicating in the same manner the individual economic course shown for fifteen cases of tuberculosis reported by Bay View Asylum among wage earners, eleven of which terminated fatally.

Chart No. 38.

Economic chart showing the average economic course of consumptives shown on the four preceding charts reported by Bay View Asylum, the Charity Organization Society and Association for Improving the Condition of the Poor, Instructive Visiting Nurse Association and the Johns Hopkins Hospital.

The red curve indicates Bay View Asylum, the green curve Charity Organization Society and Association for Improving the Condition of the Poor, the blue curve the Johns Hopkins Hospital and the yellow curve the Instructive Visiting Nurse Association.

Among the other striking features of this section was the series of charts prepared by the State Board of Health showing the prevalence of tuberculosis and the seven other principal causes of death by means of the Hewes dial.

Two of the most striking of these were half dials, upon which were indicated by means of pointers the actual number of deaths in the United States during the census years 1890 and 1900 from the eight diseases most prominent in the mortality statistics of the country.

A series of dials indicated the mortality from the principal causes of deaths in Maryland and in Baltimore city. A series of charts prepared by Frederick Hoffman, actuary of the Prudential Life, demonstrated the experience of that company with an extensive class of risks extending over several years. An interesting study of occupation, race, sex and color was included in this series. A series of the State Board of Health gave striking comparison

of the influence of race, color, urban and rural conditions on the tuberculosis mortality in Maryland.

A particularly complete study of family tuberculosis was made on the following charts:

No. 38—Mosny's study of tuberculosis in the ancestors.

No. 40—Mosny's study of tuberculosis in the descendants.

No. 43—Squire's study of family tuberculosis in the descendants (1896.)

No. 44—Squire's study of family tuberculosis among insurance claims in 1902.

No. 45—Leudet's study of tuberculosis in relatives and families.

No. 46—Leudet's study of family tuberculosis in the ancestors to determine the relatives most often affected.

No. 47—V. Weicker's study of family tuberculosis made among the patients of the Volkssanatorium Krankenheim.

A study by Coates of the infectiousness of house dirt in houses occupied by consumptives and in those where there were no consumptives was graphically shown in Chart No. 41.

Chart No. 42 showed graphically the reported frequency of conjugal tuberculosis in the State of Ohio.

An interesting series of economic and sociologic tuberculosis charts were mainly reproduced from the proceedings of the British Congress on Tuberculosis. Baudran's interesting study on the relations of tuberculosis and alcoholism was reproduced on Chart No. 48.

Chart No. 49—Reincke's study of the relation of tuberculosis to material welfare (Hamburg Experience.)

Chart No. 50—Beevor's study of tuberculosis and material welfare (England and Wales) on this chart, wages, poor relief and the price of wheat are compared with the tuberculosis mortality.

Chart No. 51—Reincke's study of the relations of annual income to tuberculosis mortality.

Charts Nos. 53, 54, 55, 56 and 57 reproduced Hayward's charts shown at the British Congress, which showed the loss in life capital and in expectation of life caused by consumption and other tubercular diseases in England and Wales.

Charts Nos. 58, 59, 60 and 61 represented the results of sanatorium treatment in the following institutions: Heilstatte Fried-

richsheim, Germany, (Dr. V. Rumpf) Volkssanatorium Kries Altena, Germany; Manchester Hospital, England.

Other charts gave the results of treatment at the Massachusetts State Sanatorium, Sharon Sanatorium and the Hospital for Consumptives near Baltimore.

SECTION ON TENEMENTS, SWEATSHOPS AND FACTORIES.

The exhibit on tenements, factories and sweatshops consisted mainly of photographs illustrating the conditions in New York and Baltimore.

The Baltimore portion of the exhibit consisted of photographs of Baltimore sweatshops and tenements, taken under the direction of the Committee, illustrating mainly conditions of overcrowding, insufficient ventilation and lack of proper hygienic care as regards the sputum.

The New York exhibit was prepared by the Charity Organization Society jointly with the New York Tenement House Commission. Twenty plans were shown of tenements recently built in conformity with the law. Ninety photographs illustrated lack of light, ventilation, overcrowding, etc., in the New York tenements and illustrated the changed conditions brought about by the Commission in many cases. A case of charts illustrated the statistical work of the "Committee on the Prevention of Tuberculosis of the Charity Organization Society of New York."

SECTION ON STATE AND MUNICIPAL PROPHYLAXIS.

The Section on State and Municipal Prophylaxis contained exhibits of all the important work now done in the restriction and control of tuberculosis in the United States. The most extensive and complete exhibit was that of the New York Health Department illustrating the work of the department from the beginning of its campaign against tuberculosis. The most striking features were the large chart showing the decline of tuberculosis in New York since 1881 and the maps of city blocks indicating the numerous cases of tuberculosis reported from certain houses for several successive years.

Other important features of this exhibit were the cards and blanks used in reporting tuberculous cases, inspections of premises, disinfection, etc. Circulars of information to consumptives and those about them (in twenty (?) languages including Chinese, Russian, Lithuanian, Hungarian, etc.) Copies of all the cards posted in public places forbidding promiscuous expectoration in New York. Photographs of the Health Department's clinic and of the Riverside Sanatorium, where advanced cases are cared for after removal from crowded tenements in the city.

The bacteriological laboratory furnished examples of outfits for the examination of the sputum, with the cards of information and registration used in connection with the specimens. The examination cards and records used in the department's clinic were also exhibited.

The cities of Boston, New Haven, Providence, Omaha and San Francisco furnished examples of the laws and ordinances against promiscuous expectoration in vogue in their several jurisdictions. Societies furnishing exhibits were the Boston Association for the Relief and Control of Tuberculosis, the Committee on the Prevention of Tuberculosis of the Charity Organization Society of New York, the Montreal Anti-Tuberculous League, the Ohio Society for the Prevention of Tuberculosis. Other cities furnishing exhibits were Cincinnati, Ohio, Chicago, and San Diego, California.

The State Commissions of Minnesota, Ohio and Wisconsin sent exhibits of their work done mainly along the lines of the establishment of State sanatoria.

The part of the exhibit of the Tuberculosis Commission of Maryland appearing in this section included the following:

1. Preliminary report of the Commission to the Governor.
2. Hospital and dispensary report blank.
3. Special medical-economic report blank (1 page.)
4. Four-page medical-economic circular.
5. Large census blank (for physicians.)
6. School report blank.

The laboratories of the State Board of Health of Maryland and of Baltimore city exhibited complete sputum outfits, including bottles, mailing cases, notification and report blanks. The State Board of Health of Massachusetts exhibited their method of collecting sputum in a wooden box made water-proof by an asphaltum preparation. The exhibit from the Boston City Labora-

tory in addition to the usual materials used in the collection of the sputum furnished a special staining bath for the rapid and facile examination of a number of specimens at one time. The method of collecting samples of sputum in diluted carbolic acid (which has been successfully used by the Boston City Laboratory for a considerable period) was illustrated in the sample.

A complete bacteriological outfit was also shown as part of the exhibit of the New York Department of Health. Statistics were given of the examination of sputum ever since the establishment of the laboratory.

An interesting part of the exhibit of the Baltimore City Department of Health was a large map filling a space about 6x8 feet, showing the number and location of the deaths from tuberculosis in Baltimore city for ten years, 1890 to 1900 inclusive. A smaller map showed on a large scale the individual houses in which deaths from tuberculosis had occurred during the period mentioned, in an area of Baltimore bordered by Druid Hill avenue, Pennsylvania avenue, Biddle and Hoffman streets (in all 175 cases.)

SECTION ON HOSPITALS AND SANATORIA.

The section on Hospitals and Sanatoria largest in point of size and only secondary in importance to the Section on State and Municipal Prophylaxis occupied the junction of the wide hall and corridor. The exhibit included foreign hospitals and sanatoria and all the important domestic sanatoria of the United States. The more striking features of the sanatorium exhibit were plans, elevations, and blue prints of prominent sanatoria, detailed sketches, photographs, both exterior and interior, illustrating the life of the patients, treatment, arrangements, etc. Diet lists, statistics of cost of building and cost of maintenance of each patient were presented in tabular form by many of the institutions.

The foreign exhibit included merely photographs but a complete set of plans for the King's Sanatorium were shown (1st, 2nd and 3rd prize essay) and plans and elevations of the large public institution recently erected in Austria.

The foreign photographic exhibit included the following institutions: Sanatorium Davos Dorf (Swiss); Sanatorium Harlacking (Munich, Germany); Sanatorium Tonsaasen (Norway); Sanatorium Waldhof Elgershausen (Germany); Sanatorium Krankenheim Goerbersdorf (Germany); Hôpital Maritime

(Breck sur Mer, R. F.); Hospital for Diseases of the Chest (Isle of Wight, Great Britain); Brompton Hospital for Consumptives (London, England); Sanatorium Veglfjord (Denmark); Sanatorium Tonespuye (France); Sanatorium Wehrwald Todtmoss (Germany); Sanatorium Arosa (Swiss); Sanatorium Brehmer; Goerbersdorf (Germany); Sanatorium Romplers (Germany); Nordrach Colonie (im Schwartzwald, Germany); Grafin v. Peuckler Krankenheim (Goerbersdorf, German); Sanatorium Hohenhonef am Rhein (Germany); Sanatorium Planegg (Germany); Sanatorium Leysin (Swiss); Heilanstalten Albert (Austria); ———— (Germany); Sanatorium Falkenstein (Germany); Sanatorium Gros Hausdorf (Germany); Sanatorium Oderberg (Germany); Sanatorium Reiboldsgrun (K. Sax German); Sanatorium Chateau de Durtel (R. F.); Hôpital Boucicault (Paris); Sanatorium Ruppertsheim (im Taunus) (Germany); Sanatorium St. Blasien (Swiss.)

Among the American Sanatoria exhibiting there were the following:

Adirondack Cottage Sanatorium — Photographs showing treatment of patients and out-of-door life, architect's plans, views in laboratory, water color photograph of colony.

Maryland Hospital for Consumptives—Photographs, exterior and interior, charts and physical examination sheets, charts showing results of treatment.

Nordrach Ranch—Model tent and photographs in frame (examination and treatment charts.)

Sanatorium for 100 *patients*—Plans by Kendall, Taylor & Stevens.

Rhode Island State Sanatorium—Drawing and plan in large frames.

Manhattan State Hospital, East (*Insane*)—Model and photographs.

Sanatorium plans, Renwick, Aspinwall & Owen—Stoney Wold (female patients only.)

West Mountain Sanatorium, Scranton, Pa.—Photographs.

Tuberculosis Committee of the Visiting Nurse Association of Chicago—Elevations and plans for a small cottage sanatorium. Sketch (in frame) and plans for sanatorium for 100 patients.

Millet Sanatorium, East Bridgewater, Mass.—Photographs, cottages and shacks of sanatorium, model sleeping box, blue prints.

United States Marine Hospital at Fort Stanton, N. M.—Photographs and plans.

United States Army Hospital at Fort Bayard, N. M.—Photographs.

Stony Wold Sanatorium, Kushaqua Lake, N. Y.—Blue print plans, drawings, photographs.

Massachusetts State Sanatorium, Rutland, Mass.—Architect's plans, blue prints, elevations, photographs. Charts showing results of treatment. History charts, examination cards, etc.

White Haven Sanatorium—Reports, history cards, instructions, tabulated statements of cost, results of treatment, photographs.

Sharon Sanatorium—Ground plans of sanatorium and adjacent buildings and grounds, photographs.

Tuberculosis Infirmary Blackwell's Island—Photographs showing exterior and interior of buildings, cottage tents, etc.

Rush Hospital County Branch, Philadelphia—Photographs, print of proposed hospital.

Loomis Sanatorium, Liberty, N. Y.—Photographs exterior and interior, showing building and sleeping sheds, architect's plans of sleeping lean-tos; summary of annual medical report; summary of meteorological observations; summary of average cost of maintenance per patient.

Hospital for Diseases of the Lungs, Chestnut Hill, Philadelphia—Two blue prints, plans in black and white, photographs exterior and interior, one print of buildings.

Tuberculosis Infirmary, Cook County Institutions, Dunning, Ill.—Large water-color in frame, showing new tuberculosis infirmary; blue print plans and elevations.

Out-of-Door Cabin, Cleeman—Plan and sectional elevation of out-of-door cabin for the treatment of tuberculosis.

The National Sanatorium Association of Canada.

Muskoka Cottage Sanatorium and Muskoka Free Hospital for Consumptives, Gravenhurst, Ont. Models of the tent with shingle roof frame sides and double board floor. Model of finish of corners in board so as to avoid angles, metal and paper sputum cups. Charts showing occupations assigned to patients gathering flowers, etc. List of flowers gathered about the sanatorium showing results of patients' walks. Daily menu, 5 blue print plans, 45 photographs, exterior and interior, showing modes of treatment, life, sports, etc.; gymnastic and breathing exercises; pamphlets

and report, temperature, weight and physical examination charts, cards issued to patients, applications for admission, etc.

Dr. Brook's Sanatorium, New Canaan, Conn.—Photographs.

Y. M. C. A. Health Farm in Denver, Col.—Photographs of colony and colony life, views of tents (mostly of Gardiner models.) model of cottage tent.

Springfield State Hospital, Maryland (Insane)—Photographs of tent treatment of the tuberculous insane at Springfield.

Bedford Sanatorium for Consumptives—Thirteen photographs, illustrating hospital, grounds, etc.

Hospital for Crippled and Deformed Children, Baltimore—Two iron frame bedsteads with swinging sides are arranged for the recumbent treatment of the acute stage of bone tuberculosis. Treatment is demonstrated with two life sized wax models recumbent upon Bradford frames, to which they are attached by the usual band across the chest.

The treatments demonstrated are those of coxalgia and cervical Potts in the acute stages, counter-extension is made on the head and feet in one case by means of head and chin straps attached to a pulley and weight. In the other case extension is made on the leg by a pulley and weight, the leg being supported at the proper angle by means of a frame fastened to the foot of the bed. A frame for the support of the head and chin in ambulant cases of tuberculous spondilitis of the cervical and upper dorsal vertebræ was shown.

Photographs showing application of the plaster jacket on patient in the kyphotone. Series of X-ray photographs showing tubercular diseases of the hip, spine and ankle. Diagrams showing the normal and diseased relations of the vertebral bodies and the improved relations brought about by hyper-extension and fixation.

Dispensary for Plaster Jackets (Baltimore)—Three plaster jackets made after the Sayre pattern.

Philadelphia Municipal Hospital—Photographs of steel and glass pavilions used in the treatment of consumptives, plans, blue prints and working drawings of the same; photographs of the roof garden of the Municipal Hospital used in the treatment of consumptive patients.

Riverside Sanatorium (of New York Health Department)—Photographs of island and plans of same; views of pavilions devoted to tuberculosis exterior and interior.

MODELS SHOWN IN CONNECTION WITH THE EXHIBIT ON HOSPITALS AND SANATORIA.

Fisher Tent.

This tent was devised by Professor Fisher of Yale University for the treatment of consumption and was generously presented by him to the State of Maryland, the only condition being that it should be used in the treatment of a case of incipient tuberculosis. I have accordingly turned the tent over to Dr. Jacobs, president of the Free Hospital for Consumptives at Towson, on the condition that it should be used as Professor Fisher stipulated.

The tent was erected for exhibition at the junction of the hall and corridor on a temporary platform laid on building paper and braced at all the corners. The following is a description of the construction and "modus operandi" of the tent:

The tent floor is 10x14 feet, the walls of the tent are 8 feet high under the eaves, from which rises a pitched roof to a central cupola, which is 4x5½ feet in horizontal dimensions and 3 feet in height. A smaller size, capable of holding one bed only, is 4x9 feet; height, 7 feet; cupola, 3x3x2½ feet.

The tent is raised a yard above the ground. The air enters the space beneath the floor through louvre-boards or "luffer-boards" or "flaps" of cloth, which are simply like clapboards hinged at the upper edges and hanging one over the other. These flaps are hung at their upper edges by cords on the inside of a wire netting surrounding the base of the tent. Thus they open inward at the slightest wind pressure, allowing every breeze to enter the space beneath the floor, but not allowing it to escape, since the pressure from the inside against the flaps closes them. The air is thus forced up through the tent. Similarly, the sides of the cupola are provided with flaps of the opposite kind; that is, they are hung on the outside of a wire netting and yield to any effort of the air to escape from the tent, but close against any wind from the outside. The effect, therefore, is to produce "wind pump ventilation," and to transform the slightest breeze into an upward current.

Free passage of air through the floor is provided by a space three inches wide between the tent floor and the walls of the tent and also by two slits two inches wide in the floor, four feet from each end. These slits, as well as the openings on the four sides, may be closed by trap-doors so that the tent may be temporarily heated in the morning when the patient wishes to dress.

The length of the tent runs in an east and west direction. The entire south wall consists of curtains which roll from the bottom on Hartshorn rollers, and may be put down in the day time to sun out the tent, or on hot, close summer nights when the air is absolutely still. In cold weather even when the air is still, the curtains need not be lowered, as the difference in temperature between the breath exhaled and the surrounding atmosphere is enough to cause the exhalations to rise and pass out of the cupola openings. To provide for this there is a small space above the flaps in the cupola always open, and also above the flaps around the base of the tent.

One other device needs to be explained. This is a "regulator" under the floor of the tent and in the centre. It performs two functions; the first and most important is to distribute the air evenly to all four sides of the tent; the second is to check the motion of the air when it is excessive, as in a gale. A false floor of canvas is constructed a foot below the real floor, and in the centre of this false floor is an opening 5x7 feet, covered with wire netting and provided with flaps like those already referred to, but hanging down from the wire netting at an angle of less than 45 degrees. Half of them, namely, those toward the east, are hung at their east edges; the other half, namely, those toward the west, are hung at their west edges. The consequence of this arrangement is that the air, passing through these flaps, is distributed half toward the east and half toward the west, so that each end of the tent is supplied with its share of air, whatever the direction from which the wind is blowing. It is found that without this distributing apparatus the air is apt to come up on the side of the tent most remote from the direction of the wind, and even in some cases to produce a revolving motion of the air in the tent, causing a down current on the windward side. With the regulator, however, this never happens.

In case of a gale the flaps in the regulator, which usually hang open, are blown shut and keep out an excessive quantity of air. The flaps at the extreme east and west are lightest and close first. The weights of the remaining flaps are graduated, so as to close successively in proportion to the severity of the wind.

The wire netting to which these flaps are attached is surrounded by canvas screens projecting seven inches downward from the false door, so as to constitute a short shaft, as it were,

thus compelling the air, before reaching the flaps, to already have a general upward direction.

The mechanism which has been described thus performs four functions:

1. The flaps surrounding the base of the tent act like in-draught fans.
2. Those in the cupola act like suction fans.
3. Those in the central opening in the false floor distribute the air evenly.
4. The latter also check excessive draughts.

The result is that the tent automatically provides pure air for its occupants, without draughts, and in all conditions of weather, with the single exception of weather which is both hot and still, in which case it becomes necessary to lower the curtains.

Gardiner Tent.

This model was exhibited by Dr. Gardiner to show the construction and working of his tent, which is very extensively used in western sanatoria. The construction is modified from the Army Sibley tent and is of a conical shape with vertical walls rising four feet from the ground. The floor is of boards with an air space beneath and air inlets protected by hinged doors so as to be opened or closed as desired. The conical wall is arranged so as to unlace and turn back to air the tent. A ventilator at the apex of the cone is weighted so as to swing open, but may be closed by a cord when necessary. The tent is heated by a sheet-iron upright cylindrical stove the smoke pipe being carried above the top of the tent.

The ventilation when the tent is closed is very perfect. The vitiated air rising along the walls and passing out through the ventilator while fresh air enters the tent continuously through the inlets in the floor. All of the openings may be closed to temporarily heat the tent for rising or retiring. In some of the models the entrance is through a small vestibule at the front.

Colorado Tent and Awning Co. (Y. M. C. A. Health Farm.)

A model of the tent made by the Colorado Tent and Awning Company and used at the Y. M. C. A. Health Farm near Denver was exhibited by the association. This tent is modelled after the ordinary wall tent with a double canvas roof, board floor and sliding windows. The tent is permanently constructed and well made. No special provisions are made for ventilation other than

a liberal door and window space. The Gardiner model is also used by the association.

Manhattan State Hospital—East,—Model Camp.

The model represents the camp of the tuberculous insane in the hospital and is wholly the work of the insane patients.

A wooden base 40x56 inches supports the tents, sidewalks, etc., of the camp, small figures of the patients, physicians, nurses, etc., and the beds of the patients are reproduced.

Muskoka Cottage Sanatorium—Model Cottage.

The model represents a frame cottage with a shingled roof and board floor. The walls are either board or canvas. The model is represented with its length extending east and west. A porch is built on the south side. Practically all of this side can be thrown open. The upper part of the interior is ventilated by means of small windows under the eaves. A ventilator opens from the roof. The room is heated by a small stove and lighted by electricity from the central plant.

Millet Sleeping Box Model.

The model represents a one story structure erected some distance above the ground. The entrance is through a door at one side reached by a stairway. A large window is placed on either side. The south end is open, closed only when necessary by a curtain drawn by a pulley. The back of the box (to the north) is closed by two pairs of heavy wooden shutters swinging horizontally, the lower half of each pair hinged at the bottom and the upper hinged at the top so that this end can also be thrown completely open.

The furnishings are shown in the interior of the model.

SECTION ON BOOKS AND PORTRAITS.

The Section on Books and Portraits contained a very complete and interesting historical resumé of the subject of tuberculosis as illustrated by the works of the best known authors on tuberculosis from Hippocrates down to modern times. The following are the books exhibited with some of their most interesting features:

Hippocrates (460-377 B. C.)—Vol. I. (Description of "habitus phthisicus.") Edition princeps (1525.) Vol. II. (Pulmonary tabes.")

Aretæus the Cappadocian (250 B. C.)

Galen (131-200 A. D.)—Methodus Medendi (milk diet and dry air in the treatment of phthisis.)

Celsus (30 B. C.-50 A. D.)—Edition Princeps (1479) (Varieties of consumption.) De Medicina (advocating change of air and long sea voyages.)

Franciscus Sylvius (1614-1672.) (First accurate description of tubercles in the lung.)

Gidéon Harvey—Morbus Anglicus (London, 1672.) (Plates showing gross appearance of tubercles.)

John Brown—"Adenochiradelogia." Being a complete exposition of the King's evil or scrofula and its method of treatment by Royal Touch.

Sydenham (1624-1689.) ("Cure of consumption by horseback riding and other vigorous exercise.")

Richard Morton—"Phthisiologia," first edition 1689, second edition 1720. (Identity of scrofula and tubercle, contagiousness of phthisis.)

Kortum—"Commentarius de Vitio Scrofulosa" (1789.) (First recorded attempts at inoculation by rubbing scrofulous matter into the neck of a boy with negative results. First comparison of tuberculous matter to cheese.)

Laennec—L'Auscultation Mediate 2 vols. (1st edition 1819.) (Stethescope, miliary nodule, unity of tuberculosis, curability of disease.)

Samuel George Morton (1799-1851.) Illustrations of Pulmonary Consumption (Philadelphia, 1834.)

Robert Carswell—"Morbid Anatomy" (London, 1838.) Figure and plates illustrating distribution of tubercles.

Bodington—"Essay on the Treatment and Cure of Pulmonary Consumption." (London, 1840) (outlining sanatorium treatment.)

Louis—"Recherches sur la Phthisie" (2nd edition, 1843.)

William A. McDowell—"A Demonstration of the Curability of Pulmonary Consumption in All Its Stages." (Louisville, Ky., 1843.)

Addison—Communication to Guy's Physical Society (1845.) (First accurate description of the histology of the tubercle.)

Klencke, 1843. (First definite statement and experiments proving that tuberculosis is inoculable.)

Villemin—"Etudes sur la Tuberculose (1868.) Communication to the Paris Academy of Medicine December 4, 1865. (Demonstration that tuberculosis is a specific infectious disease.)

Klebs—(Feeding experiments.)

Felix V. Niemeyer—Clinical lectures on pulmonary consumption (London, 1870.) (Taught that consumption with cavity formation was the result of a catarrhal pneumonia and that the tubercle was a late and secondary growth.) Gave views of proper treatment, rest for fever, fresh air and supervision of mode of life.

Robert Koch—Berliner Klinische Wochenschrift (1882.) Causation of tuberculosis—the tubercle bacillus (1882.) Demonstration that the tubercle bacillus is the cause of tuberculosis.

Works exhibited of modern writers—Knopf, Latham, Bridge. Flick, etc., and pa mphlets and journals concerning tuberculosis; La Revue de la Tuberculose, La Lutte contre la Tuberculose; Zeitschrift fur Tuberculose und Heilstattenwesen; Tuberculose Infantile; Tuberculosis (London); Tuberculosis (Deutsch Cent.; Journal of Tuberculosis, La Tuberculosi.

Some historic instruments were exhibited in the case, among which were Dr. Bowditch's paracentesis set and Laennec's stethescope.

PORTRAITS.

Hippocrates, 460 B. C.
Galenus, 1881 B. C.
Celsus (Beginning of Christian Era.)
John Latham, 1761-1843.
Matthew Baillie, 1760-1823.
Rene Theophile Hyacinthe Lænnec, 1761-1826.
Louis, 1787-1872.
Francois Joseph Victor Broussais, 1772.
Gabriel Andral, 1797.
James Jackson, Jr., 1810-1834.
Benjamin Rush, 1745-1813.
Austin Flint, 1812-1886.
Samuel George Morton, 1799-1851.
Henry I. Bowditch, 1808-1892.
Wm. W. Gerhard, 1809-1872.
Robert Koch, 1843.
Hermann Brehmer.
E. L. Trudeau.
K. Dettweiler.
Cohnheim.

PATHOLOGIC AND BACTERIOLOGIC SECTION.

This section on pathological anatomy and bacteriology contained a carefully selected series of the best specimens to be found of the pathology and bacteriology of tuberculosis.

The pathological anatomy included gross and microscopic specimens of all possible varieties of tuberculosis of the tissues and organs. Dry specimens were shown of bone and joint tubercu-

losis and specimens of tuberculosis in all the organs. In addition to the exhibit of human tuberculosis there were complete sets of specimens of tuberculosis and pseudo tuberculosis in animals including fowls, dogs, cattle, monkeys and other animals.

Cultures were shown of the avian, piscine, bovine and human tubercle bacillus, as well as stained and mounted specimens. A complete and beautiful set of photomicrographs illustrated tuberculosis in the tissues.

Skin tuberculosis was illustrated by a set of wax casts of French manufacture, the property of the Army Medical Museum.

SECTION ON DOMESTIC PROPHYLAXIS AND HOME HYGIENE.

This section included a number of the articles of clothing appliances, etc., necessary for the health and comfort of the consumptive sick, and the safety of those about them, the description of many of which are included under the manufacturing exhibit. The "model room" was fitted up in this section. All the furnishings were arranged with the idea of cleanliness and freedom from infection—muslin window curtains, wash covers for tables and bureau, separate set of dishes for patient, polished floors with wash cotton rugs, head-rest and other appliances used for the comfort of the sick.

In this section were shown Baltimore houses and streets infected with tuberculosis, overcrowded interiors and houses with balconies adapted to open-air treatment.

SECTION ON DISTRICT NURSING.

This section gave an interesting exhibit of the treatment of the consumptive poor in their own homes. Many of the photographs were of the "before and after" type and indicated the changes made in many of the small and crowded rooms by the advice and energy of the nurse. Charts and photographs illustrated improved conditions.

An interesting exhibit was shown by the Washington Instructive Visiting Nurse Association, among which was the outfit used to remove consumptives from the tenements to the parks and squares including a wheeled chair with blanket, hood, warming

pan for the feet and basket for paper cup and napkins. Maps were shown of the districts of Baltimore and Washington.

Models of screens and carriages were shown and the nurses and patients' baskets used in visiting and treating such cases.

Photographs were shown of the ingenious adaptation of houses by consumptive inmates by Dr. Meyer.

MANUFACTURING EXHIBITS.

Kny-Scherer Co., New York—Wicker reclining chair with quilted covering buttoning about the patient. (Devised by Dr. Knopf.) Dr. Knopf's metal cuspidor, metal and glass pocket sputum cups, paper sputum cups and handkerchiefs.

Seabury & Johnson, New York—Pasteboard sputum cups and holders, thermometer cases, disinfecting apparatus.

Abercrombie & Fitch—Two tents, cot, water-proof sleeping bags, socks and hood, two "loden" suits, skirt with oil silk pocket.

Arnold & Co., Baltimore—Trenner Lee fumigator (formaldehyde.) Model Baker tent.

Pullman Co.—Ventilator.

Thibert & Co.—Sanitary cuspidors.

Thurwachter & Co.—Adirondack recliner.

SECTION ON DECORATIONS.

Chart of Life.

Chart illustrating the pathway of human life with its one thronged entrance—the gateway of birth; and its many exits—the gateways of death. Oblique lines in the pathway show the vices, accidents and diseases which turn the crowd toward the exits. The population represented by dots, numbers 64,172 persons, just enough to allow one woman to finish a hundred years of life. The ages in five-year periods are inscribed on the walls. In thirty years the population would have grown from 64,172 to 96,253. The dead in that time will number 44,578, of whom 5,168 will have died of tuberculosis.

Friezes.

1. *If thou Lord wilt be extreme to mark what is done amiss, O Lord, who may abide it. For there is mercy with thee, therefore shalt thou be feared.*

2. *Jedermann hat am ende ein bischen tuberculose.*

3. *Tockner Husten, Todes Trumpeter.—German proverb.*

4. *For wilful men the injuries that they themselves procure must be their schoolmasters.—Shakespeare.*

5. *La phthisie se prend sur le zinc.*

6. *L'Alcoholism fait le lit de la tuberculose.*

7. *C'est dans le pouvoir humain de faire disparaitare du monde tous les maladies parasitaires.—Pasteur.*

8. *The prudent man foreseeth the evil and hideth himself. The simple pass on and are punished.*

9. *Pathological anatomy has never perhaps given any more decided proof of the cure of a disease than it gives in cases of pulmonary tuberculosis.*

10. *Whilst meagre phthisis gives a silent blow,*
Her strokes are sure, but her advances slow,
No loud alarms, nor fierce assaults are shown,
She starves the fortress first, then takes the town.

11. *For that which befalleth sons of men befalleth beasts; even one thing befalleth them: As the one dieth so dieth the other; yea, they have all one breath, so that a man hath no pre-eminence above a beast.—Ecclesiastes.*

12. *There is always some levelling circumstance that puts down the overbearing, the strong, the rich, the fortunate, substantially on the same ground with all others.—Emerson.*

13. *Death hath not only particular stars in Heaven, but malevolent places on earth, which single out our infirmities, and strike at our weaker parts.—Sir Thomas Brown.*

14. *The consumptive himself is almost harmless, and only becomes dangerous through bad habits.—Cornet.*

15. *We must care for the consumptive in the right place, in the right way, and at the right time until he is cured; instead of as now, in the wrong place, in the wrong way, at the wrong time until he is dead.—Pryor.*

16. ΜΕΓΙΣΤΟΝ ΔΕ ΚΑΙ ΧΑΛΕΠΩΤΑΤΟΝ ΚΑΙ ΠΑΕΙΣΤΟΥΣ ΕΚΤΕΙΝΕ ΤΟ ΦΘΙΝΩΔΕΣ.—*Hippocrates.*

17. Αἰὲι γάρ ἐν πιπτουσιν οἱ Διος κύμβοι.

DEATH ROLL OF TUBERCULOSIS.

Maria Constantinova Bashkirtseff,
Xavier Bichat,
Henry Cuyler Bunner,
Frederick François Chopin,
Stephen Crane,
John Godman,
John Paul Jones,
John Keats,
Rene Theophile Hyacinthe Laennec,
Sidney Lanier,
Jules Bastien Lepage,
Ethelbert Nevin,
Henry Purcell,
Elizabeth Felix Rachel,
Frederick Schiller,
John Sterling,
Lawrence Stern,
Robert Louis Stevenson,
Henry Timrod
Carl Maria Von Weber,
Artemus Ward,
Henry Kirk White.

[Reprinted from Maryland Medical Journal, February, 1904.]

REMARKS ON THE OCCASION OF THE OPENING OF THE TUBERCULOSIS EXPOSITION IN BALTIMORE ON THE 25TH OF JANUARY, 1904.

By William Sydney Thayer,
President of the Tuberculosis Commission of Maryland.

Ladies and Gentlemen:

A great medical classic, which marked the beginning of a new era in the world of biological science, opens with these words: "We are living in the midst of a great reform in medicine. In our day, for the first time in thousands of years, the whole area of this widespreading field of learning has been laid freely open to scientific research. Doctrines which belong to the oldest traditions of mankind are put to the test, not only of experience, but of investigation. For experience, proof is demanded; for research, reliable methods. Everywhere inquiry seeks out the most intricate conditions appreciable by the human mind; knowledge ramifies into countless minute details which disturb the sense of the unity of the human organism, and seem to many more fitted to set forth an adornment of learning than an instrument of action."

Fifty years have not passed since Virchow wrote these lines, and what a change has come over the world! The spirit of investigation and research, the development of exact scientific methods based upon such observations have spread through every branch of biological science, and the fruits at first appreciable only to the trained and initiated student are now apparent to all thinking mankind. And what fruits! To consider but one branch of learning: Diphtheria has lost its terrors, yellow fever is almost under our control, cholera and plague, but yesterday the most terrible of the invisible adversaries of man, are now vulnerable enemies in an open field. Thousands of trained and enthusiastic students in hundreds of laboratories maintained by State aid or the generosity of public-spirited citizens, are systematically approaching the prob-

lems of prevention and cure of diseases, the nature of which was but a few years ago unknown. There never was a time more fraught with hope for the future.

But with all these advances and discoveries, there have come to us new duties and increased responsibilities. One of the greatest of modern biologists has recently said: "As we march onward toward the true goal of existence mankind will lose much of its liberty, but in return will gain a high measure of solidarity. The more exact and precise a science becomes the less freedom we have to neglect its lessons. Time was when we could freely teach that a whale was a fish, but since it has been definitely established that this animal is a mammal, the error is no longer permissible. Since medicine has become an exact science, the liberties of medical men have become materially restricted. We have already seen physicians legally condemned for neglecting to observe the rules of asepsis and antisepsis. Certain liberties, such as failure to vaccinate against smallpox, spitting on the floor, * * * and a multitude of others, are worthy of a barbaric past, and must disappear with the progress of civilization."

To-day we all realize and appreciate that if we knew how a terrible pestilence arises—and more than this, how it may be prevented —we have gained a new duty; we must each one of us do his utmost to prevent it. But we know also that individual effort, "The single deed, the private sacrifice," however unselfish and earnest and courageous, will be of little avail. It is only by combined and enlightened and continued labor that we can accomplish our ends.

Ladies and gentlemen, *we know all these things about tuberculosis*, and that is why we are here this evening, to take counsel together, to put shoulder to shoulder in the furthering of a great and noble work.

[Reprinted from Maryland Medical Journal, February, 1904.]

THE STATISTICAL LAWS OF TUBERCULOSIS

By Frederick L. Hoffman,

Actuary of the Prudential Life Insurance Company,
Newark, N. J.

Tuberculosis causes annually more than 150,000 deaths in the United States at the average age of thirty-five years. At this age the normal after-lifetime is about thirty-two years, so that the real loss of life covered, measured in time, is represented by 4,800,000 years per annum. If we assume that the net value of a year of human life after age thirty-five is at least $50, the real loss to the nation resulting from the disease (a large proportion of which is known to be needless) may be estimated at $240,000,000 per annum. These astounding and almost incomprehensible figures are far from being an exaggeration, but let us assume that only one-half of this mortality is preventable, and we have a net possible saving to the nation of $120,000,000 per annum. This estimate does not take into account the social, moral and sentimental value of at least 100,000 lives, which, under different conditions, might reasonably hope to continue for many years. The mortality from tuberculosis is, therefore, a problem compared with which all other social problems of a medical character sink into insignificance, and it is safe to say that the possible prevention of a large portion of the mortality from this disease is justly deserving of the solicitude, the active personal interest and liberal pecuniary support of all who have the real welfare of the people of this nation at their heart.

Any attempt to deal successfully with the problem of tuberculosis prevention must needs proceed along lines of a comprehensive statistical investigation, for the laws and tendencies of this disease are most intelligently expressed by statistical averages reduced to a uniform basis, readily susceptible of critical analysis. It is not necessary, however, nor perhaps advisable, in an address of this kind to make any extended use of statistics, for the concepts of the problem can be readily expressed in definite language, without superfluous ratios and percentages.

It is my purpose to deal briefly with the general facts of the tuberculosis problem, which, as far as I am able to judge, are necessary for a rational understanding of the methods and means best adapted to diminish the largely unnecessary mortality of this disease.

On the outset we are confronted with a fact which is generally ignored by those who would advance the cause of disease prevention by modern methods of ordinances and laws prohibiting spitting in public places, the segregation of tuberculosis patients, sanatoria treatment, etc., namely, the all-important truth that the *mortality from tuberculosis has progressively declined in American cities for more than half a century.* For illustration, in New York City the death rate from consumption per 10,000 of population was 42 during 1851-1860, against 39 during 1871-1880 and 27 during 1891-1900. In Boston the rate was 46 during 1851-1860, 41 during 1871-1880, and 26 during 1891-1900. For Baltimore we do not have the information previous to 1875, but we find that the rate decreased from 36 during 1876-1880 to 28 during 1886-1890, and to 21 during 1896-1900. (This includes the colored element.) The tendency toward a progressive decrease in the mortality from this disease from decade to decade during the past forty to sixty years has been practically the same in all of the principal American cities. In other words, the observed decrease in the mortality from tuberculosis antedates by many years the discovery of Professor Koch and the relatively recent view that the disease is of a highly infectious character and is transmitted from man to man.

It is necessary, then, for us to consider, first, the probable causes responsible for the decrease in the mortality from tuberculosis without direct social measures or conscious efforts to produce this result. It is always hazardous to advance views for which we have no definite statistical basis of observed experience, but from a careful study of the available facts brought out in our social and industrial history I have come to the general conclusion that *the decrease in the mortality from tuberculosis in past years,* or, let us say, previous to 1890, *must be ascribed primarily to a profound change for the better in the mode of life of the masses.* I would include in this term all the elements of social progress that can be determined or measured by the statistical method, and that can be confirmed by impartial medical and other investigations.

This general conclusion I find to include at least 10 distinct or special factors, any one of which and all of which in conjunction with each other would seem to me to have been of sufficient importance to produce the phenomenon of a decreasing mortality from tuberculosis without direct social or legislative measures.

First. We may attribute the decrease in the mortality from tuberculosis to vast and far-reaching improvements in the housing of the masses of the population in cities, of which formerly, say

forty or fifty years ago, a large proportion lived in cellar dwellings, in houses located on damp and unwholesome subsoil, or on areas filled in with garbage and other health-destructive matter.

Second. There has been a vast improvement in the direction of providing tenements and dwellings with more light and better ventilation, and prohibiting entirely the use of dark interior and ill-ventilated rooms for living and sleeping purposes.

Third. The evils of overcrowding, while still considerable and often requiring drastic police interference, are, without question, less serious at the present time than formerly.

Fourth. Intemperance, while still an evil of great magnitude, is now less of a bodily destructive character than fifty, or even thirty, years ago. While the average consumption of liquor *per capita* may have remained the same (this being a fact difficult to determine), the statement cannot be called in question that the general mass of our people lead to-day more temperate lives and more free from the vice of gross intoxication than during the earlier years of our social history.

Fifth. There has been a considerable improvement in the feeding of infants and adults with food of more nutritious quality, making for the building of a body of a higher degree of disease resistance. We have substituted the ideal of a robust body and vigorous health, especially among women, for the anemic type of girls so common thirty years ago. This result is, in a large measure, due to the greater amount of outdoor life, and also to the public parks and children's playgrounds, which a more enlightened public opinion demands.

Sixth. Improved economic conditions, especially in the direction of higher wages and shorter hours of labor, substituting possibilities of rest and recreation in place of overstrain and overwork and bodily exhaustion common under earlier conditions of industrial life. What, for want of a better term, may be spoken of as the half-holiday, or vacation habit, is becoming a regular feature of life, even with the most humble laborer. Night labor, as far as possible, is gradually being done away with, resulting in a more healthy development of body and a higher degree of disease resistance.

Seventh. Child labor, formerly exceedingly common, is now practically prohibited and made impossible by law in most of the States. Constitutions which, under former conditions, would have been prematurely weakened and impaired are now permitted to reach a sufficient degree of maturity to more successfully withstand

the inherent disease-producing conditions of factory life and other indoor occupations. It is a well-known fact that occupations such as the potteries, glass works and similar industries, in which children formerly commenced to labor at very early ages, are the occupations in which the after-lifetime is very considerably below the average and in which tuberculosis and respiratory diseases are of more than common occurrence.

Eighth. Unwholesome and unsanitary conditions of factory life, of serious effect on health and longevity; dust-producing occupations, especially destructive to lung tissue, and numerous other evil conditions surrounding men and women employed in ill-ventilated factories and workshops have been largely done away with in the light of modern sanitary science through factory and labor legislation. Anyone who has studied the diseases of occupation in this country and abroad will concede that these changes for the better in the conditions of factory life have been indeed profound and far-reaching in making for a healthier and a longer life.

Ninth. School life, or the conditions surrounding children at the impressionable age of the educational period, have been materially improved by slow degrees from the close, overheated schoolhouses of the past to properly-lighted, sufficiently-roomy and properly-ventilated schoolhouses of the present. Children exposed to the earlier conditions must, unquestionably, have had their health undermined and their disease resistance lowered as the result of hours spent under unsanitary and otherwise unsatisfactory conditions which, in the light of a better knowledge and understanding, are no longer permitted to exist. While much remains to be done to improve the hygienic conditions of school life, a vast amount of improvement in this direction has been made during the past fifty years.

Tenth. There remains the general social improvement of the mass of our population, making for a higher standard of life and a more deliberate view of life and the worth and value of living. There has never been a time when the commercial value of human life was so clearly recognized as it is at the present time, and the will to live and the will to live well was never before so strongly emphasized in the life of the people. All this, I am satisfied, must have contributed much toward the development of a type less likely to fall a victim to tuberculosis under modern conditions than under the less satisfactory conditions of the past.

We may now consider *the statistical laws* which underlie the occurrence of tuberculosis in modern life. Most of the conclusions

which follow are derived from census reports on vital statistics, from the reports of local boards of health, the experience of life-insurance companies and special investigations which need not to be enumerated. As a general rule, the observations and conclusions are limited to the mortality from consumption, which forms approximately 96.5 per cent. of the total mortality from tubercular diseases. Unless otherwise stated, the rates used are 10,000 of population.

1. The mortality from consumption in the United States has decreased from 25 per 10,000 in 1890 to 19 in 1900. The fall in the death rate during the decade has been 24 per cent.

2. The mortality from consumption is greater in cities than in rural districts, but there are important exceptions to this rule, to which reference will be made later. The city death rate from consumption in 1900 was 20 per 10,000, against 13 for the rural districts.

3. The decrease in the mortality from consumption during the decade has been six per 10,000 for the cities, against not quite five for the rural districts. The social and material progress and changes, to which reference has been made in the introductory remarks, has, without question, been greater in the cities than in the country districts.

4. The mortality from consumption is greater among men than women; but here, again, we meet with important exceptions to a general rule. The death rate of males in 1900 was 19 per 10,000, against 16 for females.

5. The mortality from consumption among males in the cities was 21 per 10,000, against 16 for females—a difference in favor of females of five per 10,000 of population. In the country districts the death rate was 12 for males and 14 for females—a difference of two per 10,000 in favor of males. In other words, the mortality of males in cities is higher than the corresponding mortality of males in rural districts; also the mortality of females in cities is higher than the corresponding mortality of females in rural districts. These facts are deserving of careful consideration.

6. The decrease in the mortality during the decade 1890-1900 was five per 10,000 for males and six for females. This fact would seem to warrant the conclusion that, in a general way, the conditions making for a lower death rate from consumption have been more favorable to women than to men, and the tendency toward a lower death rate has been more pronounced in the case of women in cities than in rural districts.

7. The death rate from consumption is extremely high among the colored population, including in that term the Chinese and Indians, but primarily and almost exclusively the negro element. In 1900 the death rate of the white population was 17 per 10,000, against 49 for the colored element—a difference of 32 in favor of the white race. In other words, among the same number of population to every 100 deaths from consumption among the white population there were 288 deaths among the colored, indicating the most extraordinary continued predisposition to death from a particular disease of which we have record in the annals of hygiene and vital statistics.

8. The death rate of the colored population in cities was 50 per 10,000, against 19 for the whites. In the rural districts the death rate of the colored was 32, against 13 for the whites. If we reduce the rates to a common basis, we find that to every 100 deaths of the white population in country districts there were 246 deaths among the colored population. In other words, the higher mortality of the negro population from consumption and other tubercular diseases is, unquestionably, primarily the result of race.

9. During the decade 1890-1900 the decrease in the mortality from consumption was practically the same for both races, having been 5.65 per 10,000 for the whites and 5.55 for the colored. In the rural districts the decrease in the mortality of the white population was 4.6, and for the colored 4.3. In other words, as far as it is possible to judge, the decrease in the mortality from consumption has been largely the result of an improved environment affecting both races to practically the same extent. The wide variation in the mortality of the two races from this disease remains practically the same, and apparently unaffected by the more favorable conditions under which the present negro population lives.

10. The native white population of native stock—that is, those having both parents native born—experience a death rate from consumption considerably below the general average. In 1900 the rate was 13 per 10,000 for the native born of native stock, against 17 for the aggregate white population. The death rate decreased from 17 in 1890 to 13 in 1900. Accurate comparison cannot be made with the population largely or wholly of foreign extraction, except for a few nationalities which have been in this country for many years.

11. The foreign element in the United States in vital statistics is usually determined on the basis of the country of birth of the mother. This has been found the most satisfactory and accurate

method yet devised to ascertain the true relation of nativity to disease predisposition and mortality. Limiting our observations to ages fifteen to forty-four, we find that the death rate from consumption of those with mothers born in the United States was 16 per 10,000 living at this period of life, 15 for the English, 20 for Canadians, 21 for Germans, 23 for Scandinavians, 24 for Bohemians and 43 for the Irish. In other words, from the limited investigations which have been made into this branch of vital statistics, the Irish population in the United States experienced a death rate from consumption far in excess of the corresponding death rates of other nationalities. The rate, however, is far from being as high as the death rate of the colored population at this period of life, which was 59, compared with 43 for the Irish and 23 for the total white population.

12. The average age at death of persons dying from consumption is thirty-five years, but the true incidence of the mortality falls upon ages fifteen to thirty-five, when from 35 to 50 per cent. of the deaths from all causes are the result of tuberculosis. In other words, at ages fifteen to thirty-five from one-third to one-half of the entire mortality is the result of consumption and other tubercular diseases.

13. The death rate per 10,000 living at different periods of life was 4 at ages under fifteen, 25 at ages fifteen to forty-four, 23 at forty-five to sixty-four and 26 at sixty-five and over. In proportion to the number living, the mortality from consumption at ages over fifteen is about the same, speaking generally, throughout life. It is therefore of some importance for us to consider the indicated improvement in the mortality from this disease in its relation to age, for, other things equal, a subsequent decrease in the consumption mortality at ages fifteen to forty-four is of far greater importance to the nation than a similar decrease in the mortality from this disease at more advanced ages.

14. The mortality of males from consumption exceeds the mortality of females at all age periods by three per 10,000 at ages fifteen to forty-four, by twelve at forty-five to sixty-four and by six at ages sixty-five and over, or, speaking generally, the difference in the disease liability of the two sexes is most marked at ages forty-five to sixty-four, when the after-effects of factory and indoor life, as well as of intemperate habits, become more apparent.

15. This law, however, is subject to a very important exception. While the death rate of males is higher than the death rate of females, this is only true for the cities, for in the country districts,

at ages fifteen to forty-four, the death rate of men is sixteen, against twenty for women—a difference which we would ascribe to the after-effects of pregnancies, less properly taken care of in rural districts than in the cities, where proper medical attendance is more readily available and more generally taken advantage of.

16. The decrease during the decade in the mortality from consumption at the three age periods considered has been seven per 10,000 at fifteen to forty-four, nine at forty-five to sixty-four and eleven at sixty-five and over. In other words, the relative decline in the death rate has been most pronounced at the comparatively unimportant age period of sixty-five and over, while the decrease has been least at the age period when the commercial and economic value of human life is highest.

It would carry us too far to further extend this analysis by sexes and ages, with distinction of life in cities and rural districts, but we may point out that at each period of life the decrease in the mortality from consumption during the decade has been greater in the cities than in the rural districts.

17. Conjugal condition profoundly modifies the mortality from various causes, and much, if not most, from consumption. A critical analysis of the vital statistics by conjugal condition must needs take into account the elements of age and sex, but this would make a brief discussion impossible, while a lengthy discussion would be out of place. Males at ages fifteen to forty-four show the highest death rate from consumption among the widowers and among the single at ages forty-five and over. We would attribute this excessive mortality at ages fifteen to forty-four among widowers to the probable transmission of the disease from wife to husband, while at ages over forty-five we would attribute the excessive death rate of the single from tuberculosis to habits of life detrimental to longevity.

18. Among females the death rate from consumption is highest among widows at ages fifteen to forty-four, and among the single at ages forty-five and over, but the differences are not so pronounced as among males of different conjugal status.

19. Both sexes show the lowest death rate from consumption among married at practically all periods of life. The death rate of married women at ages forty-five to sixty-four from consumption is exceedingly low—only fifteen—compared with twenty-two for males of corresponding age.

20. Married women at the child-bearing period—fifteen to forty-four—experience a higher death rate from consumption than

married men, the rate being twenty-one for the former, against twenty-four for the latter. The difference is significant, but not very great. It is quite probable that these differences are greater in rural districts, but we have not the necessary data to confirm this view.

21. Widowers at all ages show an extremely high mortality from consumption when comparison is made with the mortality of widows of corresponding ages. At ages fifteen to forty-four the death rate of widowers was sixty-seven, against thirty-six for widows; at ages forty-five to sixty-four, widowers forty-nine, widows nineteen, and at ages sixty-five and over we find the rate to have been thirty-one for the former, against twenty-one for the latter.

22. We note further an anomaly in vital statistics and in marked contrast to the general laws of mortality, that the death rate from this disease among widowers is highest at the youngest ages, while lowest at the most advanced period of life (sixty-seven, forty-nine, thirty-one). This is highly significant, and would seem to warrant the conclusion that the higher mortality of widowers at early ages is the result of disease transmission from wife to husband. Conversely, there would seem to be a lesser liability in the transmission of the disease from husband to wife. The probable reasons for this cannot very well be discussed on this occasion.

23. Occupation has already been referred to as an element making for a high death rate from consumption among males at certain ages and under certain well-defined conditions, especially of city life. We are confronted, however, with the difficulty of briefly discussing this aspect of the problem on account of the necessity of a critical analysis by age periods and length of trade life. The subject-matter is complicated by the fact that the census reports do not show the mortality of males in specified occupations from specified diseases by specified periods of life. Since the age distribution of persons in different employments varies widely, it would be misleading to compare crude death rates except with the greatest possible caution in selected industries, where the elements are, as far as known, comparable.

Males in all occupations, according to the census, experience a mortality from consumption of twenty-four per 10,000. In the professional occupations, where the average age of the living is quite high, the relative mortality is correspondingly low, being twelve for clergymen, fourteen for lawyers and seventeen for

physicians. It, however, is safe to say, from a study of other data, that the mortality from this disease among men in professional occupations is, in fact, exceedingly favorable. Persons in the mercantile and trading class experience an average death rate of seventeen per 10,000, hotel keepers and boarding-house keepers a rate of twenty-one, saloon and restaurant keepers a rate of twenty-nine, barbers and hair dressers a rate of thirty-three, laborers a rate of thirty-seven, book-keepers a rate of forty, servants a rate of forty-three, printers a rate of forty-four, cigar makers a rate of forty-eight and stone cutters a rate of fifty-four. These remarkable differences in the death rate from consumption among men in different employments are extremely suggestive and deserving of the most careful consideration, for, in the writer's opinion, there can be no more effective measures tending to the stamping out of the disease than active efforts in the field of the diseases of occupation and a propaganda against the still considerable unhygienic conditions of factory life. The high death rate of servants, which is confirmed by corresponding data for female domestics, is also highly significant.

(To meet the possible criticism of the use of these data, which ignore the age factor, I have carefully examined into the more scientific reports on the vital statistics of England and Wales. If we take, for illustration, the age period twenty-five to thirty-four, we find that the death rate of clergymen from consumption was sixteen per 10,000, seventeen for physicians, nineteen for lawyers, twenty-three for artists and forty for musicians. Among men in commercial and agricultural employments the death rate was seventeen for agriculturists, twenty-two for grocers, twenty-seven for manufacturing chemists, twenty-eight for druggists and forty-one for general shopkeepers. For persons in general trades and industries the death rates were forty-nine for tobacconists and cigar makers, forty-eight for book-binders, forty-eight for barbers and forty for shoemakers. Among persons in recognized unhealthy occupations the death rate was sixty among hotel and inn servants, fifty-one among glass workers, fifty among printers, forty-seven among carpet and rug manufacturers, forty-three among zinc workers, forty-two among copper workers, forty-one among dyers, forty-one among saloon keepers and thirty-nine among brass workers. Among persons in recognized dangerous and unhealthy occupations the rate was forty-three among lead miners, thirty-four among tin miners, thirty-one among copper miners and twenty-eight among coal heavers. Among common

laborers, servants, etc., the rates were seventy among costermongers and hawkers, forty-four among messengers and porters, thirty-four among general laborers and twenty-three among domestic servants. Among men in all occupations at the age period of twenty-five to thirty-four the death rate from this disease is twenty-six per 10,000, which compares with thirty-four for persons in recognized unhealthy occupations, twenty-seven for persons in general trades and industries, twenty-one for persons in professional occupations and thirty-two for common laborers and servants.)

24. The season of the year, as far as it is possible to judge, affects the mortality from consumption only to a limited extent. The mortality in the United States is highest during March, April and May, and lowest during August, September, October and November. The month of highest mortality during the census year 1900 was March, with a monthly death rate of 1.8 per 10,000 of population, and the lowest were June and September, with monthly death rates of 1.3. The information is not yet sufficient to warrant final conclusions.

25. The mortality from tuberculosis varies widely in different localities, but we question seriously whether these differences are the result of climate rather than of material variations in the age, sex, race, nativity and occupation distribution of the population. The registration area of the United States, unfortunately, does not include a sufficient number of representative States, but, limiting our observations to New England, New York and New Jersey, we do not find the evidence conclusive that local variations in the death rate have been the result of variations in climate. As far as it is possible to judge, the variations appear to be rather the result of occupation, etc., than of climate.

25a. (In illustration of this point, I may add a summary comparison of the mortality from consumption in certain American cities during the five years 1896-1900. The rates are per 10,000 of population and are as follows: Cities with high death rates: San Francisco, twenty-nine; Orange, N. J., twenty-seven; New York, twenty-six; Newark, N. J., twenty-six; Pueblo, Colo., twenty-six; Jersey City, N. J., twenty-five; Boston, twenty-four; Brooklyn, twenty-two; Cambridge, Mass., twenty-two; Paterson, N. J., twenty-two; Providence, R. I., twenty-two; Holyoke, Mass., twenty-one; Worcester, Mass., twenty-one; Cincinnati, twenty-one; Philadelphia, twenty-one; Lowell, Mass., twenty-one.

Cities with low death rates from consumption: Passaic, N. J.,

seventeen; Manchester, N. H., seventeen; Binghamton, N. Y., seventeen; New Bedford, Mass., sixteen; Fall River, sixteen; Chicago, fifteen; Lynn, Mass., fourteen; Gloucester, fourteen; St. Paul, fourteen; Milwaukee, thirteen; Minneapolis, twelve; Spokane, twelve.

In Southern cities the mortality from consumption is, as a rule, very low among the white population: New Orleans, twenty-two; Washington, D. C., nineteen; Memphis, seventeen; Augusta, Ga., sixteen; Nashville, Tenn., sixteen; Atlanta, sixteen; Richmond, Va., fourteen, and Charleston, S. C., fourteen. These comparative statements are extremely interesting and valuable in that they *localize* the mortality from consumption with sufficient accuracy to point out where active efforts to suppress the disease are needed most. It is a matter of regret that I have not the data for Baltimore, since the health reports do not contain the separate tabulation of the deaths by race.

26. The census data are not published in sufficient detail to permit of a rearrangement of the mortality by geographical sections of the country according to latitude, longitude and altitude, or with special reference to certain topographic features, such as location of cities on lakes, in river valleys, at high altitudes, etc. My inquiries into the possible relation of these conditions to the distribution of consumption are as yet in a very unsatisfactory state, and no definite conclusions can be advanced. There are other factors which have to be taken into account, as, for illustration, the attraction of a large number of tuberculosis patients to cities like Denver, Los Angeles, San Antonio, etc., which would tend to produce a high local death rate from this cause when, as a matter of fact, the climatic conditions are in all probability exceedingly favorable to a cure, if not a certain prevention of the disease.

27. A study of the relation of consumption to the elements of climate, which has almost a literature of its own, confirms the view that certain climatic elements unquestionably favor the development of the disease, while others materially hinder it. The writer has not made a sufficiently extensive study of these elements to warrant him in advancing definite conclusions.

28. The relation of the mortality from consumption to surface geology, soil and topography has never been exhaustively investigated, or at least not reported upon in such a manner that the results can be utilized in this summary of the general elements of the mortality of this disease. It is, however, a generally accepted theory, and an apparently well-proven fact, that the mortality from

consumption is highest in localities with a damp soil or a clayey subsoil, making natural drainage difficult, if not impossible. The vital statistics of Baltimore have been investigated with this end in view, but the results as published by Dr. Billings are not conclusive. It, however, is reasonably safe to say that the death rate decreases with increasing altitude, and that the death rate decreases with increasing dryness of the atmosphere.

29. The relation of the mortality from consumption to class of dwellings, tenements and institutions, such as prisons, asylums, convents, etc., has been investigated to a reasonably sufficient extent, and the conclusions would seem warranted that overcrowding is in a large measure responsible for the development of the spread of the disease, and the mortality in such institutions, in the absence of rational sanitary precautions, is, as a general rule, excessive.

30. The relation of the mortality from consumption to social and economic conditions, especially to wealth and poverty, habits, such as alcoholism, etc., has been sufficiently inquired into to warrant the conclusion that consumption is much more common among the poor than among the rich, and this may be attributed to imperfect or unsatisfactory diet. The mortality from consumption is also known to be more excessive among persons of intemperate habits, and this is proven by the high death rate of saloon keepers and bartenders from tubercular diseases.

31. The relation of the mortality from consumption to religious confession has been investigated, especially by Korosi, Dr. Billings and Dr. Fishberg, and the conclusion would seem warranted that the mortality from this disease is extremely low among persons of the Jewish faith. Whether this is the result of the dietary laws of the Hebrews has not yet been sufficiently established. It, however, is reasonably proper to assume that some such a relation exists. The Jews, however, are justly praised for their high order of domestic life, which, as elsewhere pointed out, has a direct relation to the mortality from tuberculosis.

32. The relation of the mortality from consumption to personal physical condition as determined by anthropometry, especially in the interrelations of height, weight, chest expansion, respiration, temperature, pulse rate, etc., have not been sufficiently investigated to warrant entirely safe conclusions, but this much may be affirmed, that persons predisposed to consumption are almost invariably persons of inferior physical development, with evidence of imperfect nutrition, resulting in a body weight about ten pounds below

the average. This is a field which is fully deserving of some careful inquiry and consideration, for so far the contributions have been very fragmentary and of only limited value.

33. The earlier belief in the possible heredity of consumption of the child from the parent, or from collateral branches of the family, is one which, in the light of modern research, may be reasonably assumed to have been overestimated, except in so far that there can be no question but that a physical constitution predisposing to tuberculosis is often, and perhaps frequently, transmitted from parent to child. On this phase of the problem we have also need of additional data covering a large area of observation to eliminate the possibility of erroneous interpretation of the facts.

34. The duration of the disease from the time of infection to the time of death is usually given as two years or thereabouts, but on this point statistical information is required which would certainly be of great value. No definite law at the present time is known to me which would warrant final conclusions regarding this point.

35. Relative to the organs affected by tuberculosis, I have already pointed out that of the normal mortality about 96.5 per cent. is represented by consumption of the lungs. It would be desirable, however, to have a comprehensive study made of this aspect of the problem.

36. The result of treatment in hospitals and sanatoria, with strict regard to the duration of the disease and the race, sex and occupation of the patient, have not as yet been determined with sufficient accuracy, but for a few institutions we have quite trustworthy data which are certain to be of great value in the future. The earlier experience has been materially modified in late years, and it is probably safe to say that three months is the lowest limit of effective sanatoria treatment. It may not be out of place for me to refer to the admirable statistics published annually in the reports of the Johns Hopkins Hospital, in a measure the most useful and practical which are available for any hospital in this country.

CONCLUSIONS.

My object in presenting for your consideration the general statistical laws of tuberculosis is to emphasize the need of a broad basis of sound knowledge for any far-reaching sanitary or other measures which may be adopted for the purpose of diminishing by associated effort the largely preventable amount of disease and mortality from tuberculosis. The facts would seem to warrant

the view that it is possible to so localize the mortality from tuberculosis that an energetic campaign against consumption is practically certain to produce far-reaching results. If we determine upon a campaign against consumption as we find it to occur among persons in certain recognized unhealthy employments, or living in certain recognized unhealthy localities, or under certain ill-health-producing conditions, there is no doubt in my mind but that within a few years a marked diminution in the death rate will result from such well-directed and intelligent efforts. By *preventing* the disease in the first place, it will not be found necessary to erect immense and costly institutions for the *cure* of the disease. I am certain, from a careful study of the facts in the case, that such efforts should be primarily directed against unsanitary workshops, ill-health-producing occupations and the employment of physically unfit types of men in industries in which the death rate from consumption is extremely high. By adopting intelligent measures in clear recognition of the laws which determine a high or low mortality from this disease I am sure that a large portion of the present mortality from this disease will be done away with.

TABLE I.—MORTALITY FROM CONSUMPTION, 1871-1900.

(Rates per 10,000 of Population.)

Years.	Northern cities.	Southern cities.	
		White.	Colored.
1871	32.49	27.94	44.60
1872	33.33	25.90	56.28
1873	31.48	33.22	64.46
1874	30.40	27.89	58.24
1875	30.99	29.94	55.56
1876	31.26	31.50	60.56
1877	29.38	28.16	60.34
1878	29.75	30.39	64.63
1879	29.08	29.98	61.80
1880	30.05	30.76	65.61
1881	32.56	29.91	64.49
1892	31.57	29.79	64.84
1883	30.99	28.37	63.14
1884	29.85	28.11	63.66
1885	28.76	29.14	62.96
1886	28.55	26.42	61.68
1887	27.91	24.28	54.58
1888	26.36	23.05	51.92

Years.	Northern cities.	Southern cities. White.	Colored.
1889	24.74	22.02	51.24
1890	25.90	23.20	51.47
1891	24.02	21.95	50.94
1892	23.68	21.25	51.53
1893	23.12	21.39	48.98
1894	21.78	20.29	49.35
1895	21.95	19.44	48.61
1896	20.86	19.14	49.98
1897	19.97	18.43	46.53
1898	19.89	18.29	43.54
1899	20.13	17.78	43.68
1900	19.16	18.28	44.53
1871-1875	31.66	30.55	57.84
1876-1880	29.88	30.06	62.84
1881-1885	30.67	29.02	63.79
1886-1890	26.61	23.92	53.98
1891-1895	22.88	21.00	49.97
1896-1900	19.98	18.32	45.59
1871-1880	30.65	30.14	61.92
1881-1890	28.42	26.75	58.70
1891-1900	21.33	19.68	47.76
1871-1900	25.48	24.24	53.84

TABLE II.—MORTALITY FROM CONSUMPTION IN FOUR AMERICAN CITIES.

(Rates per 10,000 of Population.)

Years.	New York City.	Boston.	Philadelphia.
1851-1860	42.2	46.3	...
1861-1870	38.9	40.7	32.1
1871-1880	39.3	39.9	31.7
1881-1890	37.7	38.0	29.0
1891-1900	26.7	26.2	22.1

	Baltimore. (White and colored.)
1876-1880	36.3
1881-1885	33.8
1886-1890	28.3
1891-1895	24.3
1896-1900	21.3

(Above data compiled from official health reports, supplemented by correspondence with health departments.)

TABLE III.—MORTALITY FROM CONSUMPTION BY RACE.

(Rates per 10,000 of Population.)

Registration Area (Total).

Years.	Aggregate population.	White population.	Colored population.
1890	24.5	23.0	54.6
1900	18.7	17.4	49.1

Registration Area (Cities).

Years.	Aggregate population.	White population.	Colored population.
1890	26.6	24.7	56.3
1900	20.5	18.8	50.4

Registration Area (Rural).

Years.	Aggregate population.	White population.	Colored population.
1890	18.1	17.8	36.5
1900	13.4	13.2	32.3

(Compiled from United States Census of 1900, Vital Statistics, Part I, p. clxxvi.)

TABLE IV.—MORTALITY FROM CONSUMPTION BY RACE AND SEX.

(Rates per 10,000 of Population.)

Registration Area (Total).

	White.		Colored.	
Years.	Males.	Females.	Males.	Females.
1890	24.0	22.0	57.8	51.5
1900	18.8	15.9	52.7	45.5

Registration Area (Cities).

	White.		Colored.	
Years.	Males.	Females.	Males.	Females.
1890	26.5	23.0	60.0	52.8
1900	21.2	15.5	54.7	46.4

Registration Area (Rural).

	White.		Colored.	
Years.	Males.	Females.	Males.	Females.
1890	16.5	19.1	36.4	36.6
1900	12.2	14.1	30.2	34.5

(Compiled from United States Census of 1900, Vital Statistics, Part I, p. clxxvi. Part I, p. clxxvii.)

TABLE V.—MORTALITY FROM CONSUMPTION IN THE REGISTRATION AREA—UNITED STATES.

DEATH RATES BY AGE, COLOR AND BIRTHPLACES OF MOTHERS.

(Rates per 10,000 of Population.)

Color and Birthplaces of Mothers.	Ages. Under 15.	Ages. 15-44.	Ages. 45-64.	Ages. 65—over
White	3.2	23.5	22.1	25.2
Colored	24.6	58.7	51.8	54.9
Mothers born in—				
United States	2.8	16.3	13.2	17.6
Ireland	4.2	42.8	34.1	32.5
Germany	2.7	20.6	20.8	23.5
England and Wales	2.7	15.1	17.3	23.4
Canada	3.5	20.0	16.4	23.7
Scandinavia	3.2	23.4	26.7	23.7
Scotland	3.3	20.1	20.2	23.9
Italy	5.1	15.0	15.7	14.5
France	4.7	22.1	20.0	16.3
Hungary	3.9	11.3	12.5	18.7
Bohemia	1.3	23.5	12.5	10.1
Russia	2.7	13.1	17.3	24.9
Poland	1.1	6.7	10.4	24.3
Other foreign countries	4.6	18.9	26.4	23.4

(Compiled from United States Census of 1900, Vital Statistics, Part I, p. clxxviii.)

[Reprinted from Maryland Medical Journal, February, 1904.]

HOUSE INFECTION OF TUBERCULOSIS.

By Lawrence F. Flick, M.D.,

Director of the Phipps Institute for the Study, Prevention and Cure of Tuberculosis, Philadelphia.

The kaleidoscopic phenomena of this earth as we see them around us are the result of a continuous alternation of life and death. In this beautiful panorama death is as necessary as life. Something is always dying that something else may live. Inorganic matter continuously is being changed into organic matter and organic into inorganic. For changing organic matter into inorganic matter God has created the micro-organic world.

A micro-organism which, perhaps, has slipped away from its natural place in organic nature, and in consequence has done much damage to man, is the tubercle bacillus. In the great division of organic matter it generally is credited to the vegetable kingdom. In a classification of micro-organisms it is technically known as a facultative saprophite. By this is meant that ordinarily it gets its living as a parasite on some higher organism, but that it may subsist on dead organic matter as a saprophite. In a subclassification of micro-organisms it is known as a facultative anaërobic parasite. By this is meant that ordinarily it grows in a tissue from which air is excluded, but that it may grow in some substances, under certain conditions, in the presence of air.

When the tubercle bacillus grows in the tissue of a human being or of an animal it gives rise to a condition which has forcibly arrested the attention of man because of the suffering, sorrow, and misery which accompany it and follow in its wake. In the early history of medicine this condition was named phthisis and consumption. In more recent times it has been divided into two epochs, the earlier being called tuberculosis and the later consumption. In earlier times, too, the condition was viewed by mankind generally as a providential visitation, the punishment for sin, touching not only the immediate offender, but reaching the offspring to the third and fourth generation. Science has demonstrated that it is a mere episode in nature subject to natural laws and absolutely under the control of man's will.

Man is interested in tuberculosis because it is a disease. The same processes and phenomena in other fields of nature give pleasure to man, but here they give discomfort, and are followed by sorrow and misery, because man himself is the field of operation.

The word disease means want of ease. Quite naturally, man has given much thought to how to avoid getting tuberculosis and how to get rid of it when it afflicts him. By reason of his superior intelligence man has always been able to control his organic foes so far as visible objects are concerned, but in his fight against the micro-organic world he is confronted with a much more serious problem. Much has been done, however, to throw light upon this newly-discovered enemy, and already it is demonstrated that man need no longer get tuberculosis, and that if he is so unfortunate as to get it, he need not die of it. Unfortunately, the knowledge which makes this new dispensation possible is still in the hands of a few.

All diseases which are caused by micro-organisms are communicable. This is a self-evident proposition. Whatever is living can only come from a parent, and phenomena which are due to the growth and development of living organisms cannot arise except by reason of the growth and development of those organisms. There is a difference, however, in the manner in which parasitic micro-organisms are conveyed from one person to another. Some are conveyed through the instrumentality of insects, some by means of water, and others by contact, direct or indirect. Some parasites have two kinds of hosts, a major and a minor host; some can reproduce themselves outside of a host, and others always remain dormant when out of the host. Parasites which have two hosts and parasites which can reproduce themselves outside of a host may be conveyed from one person to another over long distances, whilst parasites which are conveyed by contact can only be conveyed within a limited, circumscribed environment. The yellow-fever parasite, for instance, is conveyed through the mosquito, the typhoid-fever parasite by water, and the tubercle bacillus by contact.

All diseases which are conveyed by contact are termed contagious. Contagious diseases are not necessarily alike, however. There is a great difference in the intensity of contagion. The acute contagious diseases are much more intensely contagious than the chronic contagious diseases. In principle the contagion of all is the same, but in practice the method differs widely. Smallpox, measles and scarlet fever, for instance, are contagious in exactly the same sense as tuberculosis, so far as the principle is concerned —that is, they are conveyed by contact—but the intensity of the contagion is so much greater with them than with tuberculosis that practical measures for the prevention of the former would in no sense apply to the latter. Smallpox, measles and scarlet fever

affect the whole body, and contagion is rapidly given off from the entire body. Tuberculosis is a local disease, and contagion is given off from one or two points only. In smallpox, measles and scarlet fever the matter which carries the micro-organisms may be invisible; in tuberculosis it always is gross and easily seen. In smallpox, measles and scarlet fever places and things soon become intensely contaminated; in tuberculosis it takes a long time to produce such a result. Intimate association, therefore, with a person suffering from smallpox, measles and scarlet fever without contracting the disease is impossible, unless the person thus exposed has an immunity from vaccination or previous attack, whilst intimate association with a consumptive without contracting the disease is quite feasible.

The contagion of tuberculosis, indeed, is of a kind by itself. It differs somewhat from the contagion of every other disease of which we have knowledge. It is so unique that writers have had some difficulty in finding an epithet descriptive of it. This is the reason why many writers object to calling tuberculosis contagious. Some would have us call it communicable, but this term is too generic. Others have suggested the epithet infectious for it, and this does not fit at all, because it has a specific meaning which only applies to such diseases as malaria and yellow fever.

The most striking feature about the communicability of tuberculosis is that it depends almost entirely upon the house. An inclosure of some kind is so necessary for the conveyance of the disease from one person to another that contagion is impracticable without it. It is therefore with good reason that we use the phrase house infection of tuberculosis when we speak of the practical manner in which the disease is spread in a community. The word infection, of course, is used in the broad sense of conveyance, and the word house in the broad sense of an inclosure. The phrase tells pretty nearly the whole story of the communicability of tuberculosis, and covers the entire proceeding from the beginning to the end—garnering the seed, preparing the soil, implantation, rearing the tender plant, nurturing the full-grown shoot, maturing and harvesting.

The house is the granary of the tubercle bacillus outside of its host. Were it not for the house the tubercle bacillus would soon have to perish from the face of the earth. It could not be preserved. Sunlight, air and water are its natural enemies. The water dissolves it out of its cache, and the sunlight and air destroy it. How long tubercular matter may remain vital in the open air

has not been definitely determined, but all agree that the time is very short. Even when the bacilli in such matter are not killed they are weakened so that they will not readily take root when planted. In the house, on the contrary, tubercular matter may remain vital for a long time, because it becomes dry and the broken-down tissue serves as a cache for the bacilli. Even when the matter becomes finely pulverized so that the bacilli no longer have so much protection, it remains vital for a long time, because the sun and air cannot get to it.

Ordinarily the tubercle bacillus is dependent upon other micro-organisms for its exit from its host. These are the streptococcus and the staphylococcus. They are pus-producing organisms, and are very adept at destroying tissue. When they join forces with the tubercle bacillus they kill and soften the tissue which has been invaded by the tubercle bacillus, and then Nature casts it out. A double purpose is served in this way, the tubercle bacillus is helped out of its host and is given a protective covering towards preservation while out of the host. The broken-down tissue which is thrown out forms the protective covering.

In the transition of the tubercle bacillus from one host to another we have a beautiful illustration of Nature's jealous care of every form of life. The tubercle bacillus is a motionless, helpless micro-organism, which can grow and reproduce itself only under certain conditions in a definite soil, and which requires during the interim between its exit from one host and its entrance into another, special protection, and for admission into a new host special opportunities. These are secured for it indirectly through its toxin and the toxins of its associates. By sensations set up in the nervous system it lures its victim into the very place where exist the best conditions for the preservation of its species and the best opportunities of finding a new host. Consumption is the autumn of tuberculosis, the blossom grown into ripe fruit. When it comes on the victim, by reason of his chilliness, malaise, and general feeling of helplessness, seeks shelter in some inclosure, and is deluded with the idea that the farther he can get away from sunshine and fresh air the better are his chances of recovery. The house thus becomes the harvest field of the ripe tubercle bacillus, and the seed quite naturally falls into the very place which by Nature is intended for its granary.

The house also prepares soil for the tubercle bacillus. We have every reason to believe that the bacillus cannot get a foothold in perfectly healthy, normal tissue. It is quite likely, indeed, that

primordially the tubercle bacillus was a saprophite only, and that its function in the world was to change dead organic matter into inorganic matter. It is easy to conceive how gradually it may have evolved into a parasite by growing on tissue which, while not dead, was much debased. At any rate, even at the present time it does not seem to be able to invade tissue until the tissue has been injured in some way, either by malnutrition, by traumatism, or through the agency of some other micro-organism. Malnutrition is one of the most common predisposing causes of tuberculosis.

The physical life of man and animals is a chemical process. There is a combination of certain elements through the instrumentality of a living cell with evolvement of beings endowed with life. Food, air and water are the substances used in the process. In proportion as these substances are at hand in proper quantities the being evolved is a healthy one, and in proportion as any of the substances are deficient or defective the being is an unhealthy one. Of the three substances required in this chemical process air is, perhaps, the most important, and certainly the most necessary. Life may be maintained for some days without food and water, but for a few minutes only without air. The same is true of health. A person may keep fair health on a stinted supply of food and water for a long time, but soon succumbs to a stinted supply of air. This probably is due to the fact that air plays a double *rôle* in health. It not only carries in oxygen for chemical purposes, but it carries out poisonous products of chemical action. It is believed by some that rebreathed air produces soil for the tubercle bacillus more through the poisonous products of combustion which are disseminated in the air than by reason of deficiency of oxygen. Probably it does it by both. At any rate, housed human beings and animals are very prone to tuberculosis. Deficiency of oxygen certainly leads to malnutrition. Too much food and too little air not only lead to defective metabolism, but throw upon the organs of the body poisonous products which must be gotten rid of to the detriment of the whole system.

Implantation of the tubercle bacillus is greatly facilitated by the house. For implantation prolonged intimate contact with a person, place, or thing which has been intensely contaminated with tubercular matter is necessary. The mere presence of a few tubercular bacilli is not sufficient. Everybody has some resisting power to tuberculosis, and with everyone there is a minimal dose of tubercle bacilli which will give an implantation. No doubt this dose differs with different people, but resisting power of some kind

exists to some extent in everyone. Even in inoculation experiments on animals a minimal dose has been found below which injections prove negative. This minimal dose in a sense measures the individual's fighting capacity against the disease. So long as the minimal dose is not reached an implantation cannot take place. Frequent warfare against a dose below the minimal dose increases the resisting power of an individual and raises the minimal dose. With animals the minimal dose which can give an implantation gradually can be increased until almost complete immunity has been established. Experiments upon animals have been made by inoculation. It is quite probable that by the natural mode of entrance of the tubercle bacillus into the system the minimal dose is larger than by inoculation. The natural mode of entrance is by the alimentary canal or the respiratory tract. At both of these ports of entry there is strong opposition to admission. The gastric juice has some germicidal powers, and all along the respiratory tract there are devices for keeping out micro-organisms. Beyond the ports of entry lie the lymphatics and lymphatic glands. and beyond these the phagocytic bodies of the blood, all of which wage war against micro-organisms that may pass the ports of entry. From what has been done experimentally on animals and from what we have been able to observe clinically on man we have good reason to believe that the minimal dose of tubercle bacilli necessary for an implantation by the natural mode of entrance is quite large. This is not a mere speculation either. Out of every five people who are intimately exposed to the contagion of tuberculosis for a long period of time under the most favorable conditions for an implantation only one person develops the disease. This shows that implantation is exceedingly difficult even under most favorable circumstances.

An inclosure is the one place in which contamination with tubercular matter can become sufficiently intense to create an environment capable of overcoming the resisting power of man and producing an implantation. It is only in an inclosure that vital tubercular matter can accumulate. In the open air, water, sunlight and air devitalize it nearly as rapidly as it is given off! Tubercular matter ejected in a house, unless immediately devitalized, artificially dries and is distributed about in particles varying in size from big chunks to impalpable dust. In these particles the bacilli are cached and preserved. Gradually all the particles are reduced to dust, either by trituration, oxidation, or the action of saprophites. This tubercle-laden dust settles on the walls, on furniture,

and on everything in the inclosure. In the course of time there is quite an accumulation of vital tubercular matter in such a place, and every time the air is disturbed tubercle-laden dust is set in motion. Here, then, finally is an environment capable of giving an implantation of tuberculosis. Occupancy of such a room means constant inhalation and frequent deglutition of tubercular matter. Tubercle bacilli continuously find their way into the system, and it is only a question of time when more have gained entrance than can be successfully withstood by the guards and disease-fighters of the body. The result is implantation of tuberculosis.

The kind of inclosure which offers the best environment for the implantation of the tubercle bacillus is, first, the home, and second, the workshop. The home is of all places most prolific of new implantations of tuberculosis. It was on this account that in bygone days tuberculosis earned for itself the reputation of being an inherited disease. Tuberculosis is a family disease. It can most easily be implanted around the hearthstone. It follows the family tree in its distribution, and when it once gets into a family it follows that family in all directions until it either has exterminated the family or exhausted the soil, and has made what is left of the family immune. The part of the home in which implantations most frequently take place is the bedroom, and next to the bedroom the dining-room. The bedroom usually is the place where the victim of tuberculosis spends his last weeks or months—a period during which the disease is most intensely contagious. Among the very poor the dining-room often is used as a bunking-place for the stricken one until a day or two before death. Under such circumstances the dining-room becomes very much contaminated and becomes a prolific source of new implantation.

The workshop is a very common means of spreading tuberculosis. By workshop, of course, is meant any inclosure in which one or more people are employed. Tuberculosis is an extremely chronic disease, and usually runs a long course even in its contagious stage before its victim is incapacitated for his usual occupation. Some people work with the contagious stage of tuberculosis for the greater part of a working lifetime, occasionally being thrown out of employment for a few weeks or months on account of an exacerbation, and again returning with as much vigor as before. Unfortunately, habits of men and women in the matter of spitting make it easy for a consumptive to contaminate his immediate environment in a shop, if not the entire shop. One consumptive, perhaps, cannot contaminate a large shop so as to

produce an infectious environment of the entire shop, but he can produce an environment around his own stand capable of implanting the disease in one or more of those next to him, and before long he has associates in the task of polluting the shop. In a workshop in which a case of tuberculosis exists careful investigation will reveal the presence of other cases in various stages of the disease. Deaths will occur from such a shop at regular intervals for an indefinite period so long as the shop is permitted to remain contaminated.

Inclosures such as hotels, churches, public halls, places of amusement, and public conveyances, in which people stop for a short time only, are not apt to give rise to many implantations of tuberculosis for two reasons. First, because a consumptive rarely remains in them long enough to produce a contagious environment capable of giving an implantation, and secondly, because healthy people seldom remain in them long enough to get an implantation. There is some danger of contracting the disease in such places for people who are employed in them in the capacity of cleaners and caretakers, but for the casual visitor practically there is no danger.

Things which have been intensely contaminated by having been used for a long time by a consumptive may give the disease to others when kept or used indoors. In the open air they may be harmless, unless worn upon the person. Contaminated furniture, carpet, and hangings of various kinds, when taken into a perfectly sterile house, may themselves contaminate the house sufficiently to create an environment capable of implanting the disease. The tubercular matter adhering to such articles is distributed about and settles on walls and floors. In the open air, on the other hand, tubercle-laden dust from such articles is apt to be scattered about over such a wide area as to make it impracticable for any one person to get enough of it to give rise to an implantation.

The house nurtures the tubercular growth when an implantation has taken place. Mere implantation of the tubercle bacillus does not necessarily mean a development of a full-fledged tuberculosis. The disease always begins in a very small way, and then attracts practically no attention. The first crop develops and runs through its course, and a second follows perhaps a little larger than the first. This is followed by a third and fourth, each a little larger than the preceding one, and thereafter another larger still, until finally so much tissue has been invaded and destroyed as to make death inevitable. At any time during the progress of the disease prior to the destruction of tissue essential to normal functions of

the body the economy has within itself the power of throwing off the disease. Autopsies prove that this often is accomplished by Nature unaided by medicine. It probably would be accomplished in all cases were it not for the house.

In the beginning of the tubercular process the tendency to recovery is so great that the slightest aid to Nature may turn the tide toward recovery. The process by which recovery takes place probably is healthy metabolism—that is, a perfect change of food into tissue. Implantation has taken place because the individual temporarily has been a little below par as a result of improper food, insufficient air, overwork, dissipation, an attack of some other disease, or some such matter, one or all. Under proper conditions the implantation is rooted up before it can grow into tuberculosis. All that may be needed is a little rest, a little extra food, and a little more fresh air. In some cases recovery might take place if a little rest could be had, even without extra food and air; in others if better food could be had, even though no rest could be taken and the air supply could not be changed. But in all recovery would almost surely follow a life in the open air, in spite of bad food supply and overwork. Life in the open air enables one to digest coarser food and to do more work without fatigue than is possible indoors. This is probably due to the fact that in the open air the poisonous products of combustion are promptly removed from the system, and thus are prevented from embarrassing the entire organization. To cure tuberculosis we must have perfect metabolism, and this we only can have when enough fresh air is taken into the system night and day to oxidize the food and cleanse the blood. Imperfect metabolism predisposes to tuberculosis by debasing the tissues and making soil for the tubercle bacillus.

House life undoubtedly plays an important *rôle* throughout the entire course of tuberculosis to its culmination in consumption and death. With every recurring crop of tubercles the organs of the body become more embarrassed, and the economy is less able to carry on the warfare against the disease. When the disease is in the lungs, as it frequently is, the air supply grows less with each destruction of lung tissue. Fortunately, Nature has given all air-breathing creatures ample lung capacity, enough and to spare, so that a great deal of lung tissue may be destroyed without interfering with the functions of the body, provided the air supply is right. Under these circumstances other organs, no doubt, supplement the lungs in their functions of elimination. Everything hinges upon

an ample supply of fresh air, however. When this is at hand healthy metabolism may be maintained even when the disease is advanced, and through this health may again be reached. Tuberculosis makes its progess because its victim is shut up in a house where he cannot get fresh air. Unfortunately for the poor, an ample supply of fresh air is impossible. Their homes, as well as their workshops, have been constructed on a mistaken idea that whatever shuts out air, heat and cold is conducive to health. The large death rate from consumption really must be ascribed in a great measure to bad ventilation in home and workshop.

The last scene of conflict in tuberculosis between the victim and his foe is the house. Tuberculosis develops into consumption because of the house. This does not mean that people could not get tuberculosis if they lived out of doors, for birds of the air and animals of the field get the disease. Tuberculosis, however, in itself would seldom prove fatal. Both animals and human beings may go through life with tuberculosis and reach old age without being seriously inconvenienced by it. Lots of animals and people do. Dr. Trudeau has shown by experiments on animals that life in the open air greatly retards the development of tuberculosis and promotes recovery. Rabbits which he inoculated and penned up died, whilst rabbits which he inoculated and permitted to run at large maintained good health, although they developed tuberculosis. In sanitoria where consumptives are made to live out of doors wonderful improvement sets in, even when the case is incurable. Frequently all the symptoms of consumption disappear, and the patient becomes comfortable even when so much tissue has been destroyed that recovery is physically impossible. In other words, even consumption in the open air loses all its most serious symptoms. The house makes and maintains consumption, and consumption kills.

Consumption may well be termed a house disease. Without the house it cannot exist. It depends upon the house for its implantation, propagation, and for evolution of all its phenomena. The house is the place where the tubercle bacillus lies dormant in wait for its host; it is the place where the new host gets his implantation; it is the place where the tubercular subject gradually becomes a consumptive, and it is the place where the consumptive dies.

In studying the progress of civilization in the light of modern science one is struck with the egregious blunders into which man has been led by his desire for privacy and comfort. He has built

his house to keep out his enemies, to protect himself from heat and cold, and to screen himself from the curiosity of his neighbor. He has sought to make his home his castle, but in reality he has made it the place wherein he courts death.

If man desires to free himself from the great white plague, he will have to retrace his steps from some of what he considers advanced points of civilization. He will have to learn, among other things, that fresh air is God's greatest gift on earth, and that whatever shuts out fresh air shuts out health and happiness. In house infection he will find the key to the entire problem of stamping out tuberculosis.

SUMMARY.

1. Tuberculosis is a disease due to the parasitic growth of a micro-organism on the tissues of a human being or animal. Being due to organic life, it is communicable.

2. Tuberculosis is contagious. The contagion of tuberculosis is different from the contagion of acute contagious diseases, however. It is slow and can be avoided easily in the presence of a consumptive, whilst that of acutely contagious diseases is rapid and cannot be avoided in the presence of those who have such diseases.

3. The contagion of tuberculosis is closely associated with the house. An inclosure of some kind is necessary to make it effective.

4. The house is the granary of the tubercle bacillus. It is the place in which tuberculous matter is kept vital until the bacillus can find a new host.

5. Out of doors tubercular matter becomes devitalized in a short time through water, light and air. Enough cannot accumulate in a vital state to create a contagious environment.

6. Everyone has some resisting power to tuberculosis. Some have more than others. Practically all have sufficient resisting power to withstand occasional exposure to tuberculosis and exposure out of doors.

7. For an implantation of tuberculosis prolonged intimate exposure and an intensely contagious environment is necessary to overcome resisting power. This is had in the home and the workshop.

8. The house prepares soil for the tubercle bacillus.

[Reprinted from Maryland Medical Journal, February, 1904.]

BOVINE TUBERCULOSIS A FACTOR IN THE CAUSATION OF HUMAN TUBERCULOSIS.

By Mazyck P. Ravenel, M.D.,

Bacteriologist of the State Live-Stock Sanitary Board of Pennsylvania; Assistant Medical Director of the Henry Phipps Institute for the Study, Treatment and Prevention of Tuberculosis.

The work of Villemin in 1865 first proved definitely that tuberculosis was a communicable disease, and also went far to show the unity of the disease as seen in man and the lower animals. Whatever doubts may have existed as to the accuracy of his teachings were dispelled in 1882 by the discovery of the bacillus of tuberculosis by Koch, who demonstrated also that the same germ caused all the various manifestations of the disease seen in different parts of the body and in different species of animals. Based on this opinion, laws were made in almost every civilized country in the world regulating the use of milk and meat from tuberculous cattle in order to protect man from this source of infection.

Until 1896 there was a practical unity of opinion among physicians on these points. In this year Dr. Theobald Smith showed that the tubercle bacillus as found in cattle had a very much greater power of producing disease than that ordinarily found in man. It remained for Koch, however, in repeating Dr. Smith's experiments, to draw the sweeping conclusions that tuberculosis of man and tuberculosis of cattle were so different in their nature that it was impossible to transmit human tuberculosis to cattle, and that man had little or no cause to fear contagion from cattle.

These views were so subversive of existing beliefs and so radical in their effects on public-health laws that a storm of protest was aroused, and much study of the subject has resulted.

I wish to examine into the soundness of the stand taken by Koch in the light of the evidence at hand. The subject may be approached from three standpoints—first, direct experimental transmission of tuberculosis from man to animals; second, clinical evidence of its transmission from animals to man, and third, theoretical considerations. The first point is susceptible of direct experimental proof, and can be disposed of in a few moments. Chaveau was the first, in 1868, to prove that cattle could be infected with tubercular material from man. He succeeded in infecting his animals through the digestive tract by intravenous inoculation and by subcutaneous inoculation. At the time tuberculin had not been discovered, but Chaveau foresaw the objection

that might be raised as to the previous existence of tuberculosis in the experimental animals, and guarded against it by selecting them from the Jura Mountains, where the disease was unknown.

In 1879 Bollinger succeeded in transmitting tuberculosis of man to cattle, and of others who have made similar experiments I may mention Klebs, Crookshank, Kitt, Sidney Martin, and more recently, since the publication of Koch's paper in 1901, Thomassen, Nocard, De Long, Arloing, Westenhoffer, Max Wolff, Schottelius, Febiger and Jensen, and Hamilton and Young. At the laboratory of the State Live-Stock Sanitary Board of Pennsylvania we have also succeeded repeatedly in transmitting human tuberculosis to cattle. These experiments were done before the publication of Koch's paper, and most of them reported at the London congress in 1901.

I may single out from the list the experiments of Hamilton and Young, which have just been published. They began with twenty (20) calves, one (1) of which died during the preliminary period of observation from some intercurrent affection. Nineteen (19) were inoculated with human material, and of these, fifteen (15) developed tuberculosis, while four (4) resisted the inoculation The diagnosis in all fifteen (15) of these cases were made by macroscopic and microscropic examinations, as well as by the reinoculation of guinea pigs. Lastly, in this connection we have the report of the Imperial Sanitary Office of Germany, which will be considered later at greater length, where out of sixteen (16) inoculations made with material taken from children they succeeded in producing tuberculosis in cattle four times, or 25 per cent. In other words, in one-quarter of all cases of tuberculosis in children examined by them they succeeded in transmitting the disease to cattle.

The second phase of our subject is the consideration of transmission of tuberculosis from cattle to man, and here we are deprived of the benefit of direct experimental evidence. We have, however, a number of cases in which accidental inoculation has taken place, some of which have ended in general infection, followed by death. I have myself had four such cases, come under my observation, two occurring in an assistant in my laboratory. In both of these cases the source of infection was known to be bovine, which was further proven by the excision of the lesion, the inoculation of guinea pigs, and the isolation of the bacillus in pure culture. I have here a photomicrograph of a section taken from one of these cases. In addition to this, cases have been

reported by Krause, Troje, Spronk and Hofnagle, Lassar, Tschering, Pfeiffer, Hartzell, Kurt Muller, De Long, Joseph and Trautman. I will give the details of only one of these, the case reported by Troje, which is one of the most typical and is able to bear the most severe criticism. The journals report that this case was submitted to Koch, who agreed that there was no point lacking in the evidence.

A young butcher in good health, and with no hereditary taint, wounded his right forearm slightly while working on a tuberculous cow. The wound healed under treatment, but six weeks later showed signs of inflammation, and a tubercle formed on the internal face of the elbow. There were two small fistulæ on the forearm, and enlargement of the ulnar and axillary lymph glands. A month later the middle forearm was covered with granulations, which steadily increased in area, and in spite of treatment, at the end of two months assumed the character of lupus. Histologic examination at this time proved the tuberculous character of the disease. Two years after the injury Troje found an abscess which extended into the deep muscular layers. The pus contained tubercle bacilli, and the tissues showed typical tuberculous lesions. Some months after the glands of the left axilla and subclavicular space were extirpated, and proved to be tuberculous. All possibility of infection from human sources were excluded by Troje.

The second consideration under this head is inoculation by ingestion. It has been proven repeatedly by experiments that ingestion is an easy way in which to infect animals, and we have good evidence that in mankind such cases occur also. It must be admitted, however, in our clinical cases that all of them have some defect, inasmuch as we cannot exclude positively all other sources of infection. In regard to this, however, the evidence is as good as we have in cases which we admit to be by inhalation. It is generally accepted by all who have worked along these lines that inhalation of dried sputum is the chief source of infection from man to man, and yet if we demand strict proof of this, very little evidence can be adduced. Of the cases of clinical evidence through feeding which have passed into literature I may mention those of Von Ruck, Stang, Demme, Gosse, Ollivier, Law, Ebers, Bang and Rievel, thirty-eight cases in all, where the evidence is very direct and very strong. One of these cases reported by Gosse, of Geneva, is so strong that Nocard has well said, "It has almost the value of an experiment." Gosse was a physician himself and the son of a physician. His own daughter was infected by drink-

ing the milk of a cow with tuberculosis of the udder on his own farm, and he had the remarkable courage to perform a post-mortem and give the results to the scientific world.

Directly in line with infection by ingestion comes the consideration of post-mortem evidence, which is somewhat contradictory. In England, for instance, we have a general average of primary intestinal tuberculosis of something over 25 per cent. In London Guthrie reports at the Children's Hospital at Paddington 24.6 per cent.; Still, at the Great Ormond Street Hospital, 23.4 per cent.; Shennan, at the Royal Hospital at Edinburgh, 26.1 per cent. In Germany, according to Koch's figures, the average is very low, but it must be said that he has not so far given a fair consideration of the available evidence. We have the report of Heller, of Keil, who, while he found only 1.43 per cent. of primary intestinal tuberculosis, found but 37.8 per cent. in which the principal lesion was in the intestine, the mesenteric gland, or the abdominal organs, so that we may conclude that all of these cases were of intestinal infection. Furthermore, Professor Hueppe, of Germany, states that the percentage of primary intestinal tuberculosis in Germany varies from 25 to 30 per cent. We have also the figures given by Von Hanseman, of Berlin, who states that he has seen twenty-five cases of intestinal tuberculosis during seven years, and considers it much more common than is generally believed.

In America we have not a great collection of figures on this point, but with perhaps a single exception those at hand indicate a much smaller percentage of primary intestinal infection. This difference in different countries and in different parts of the same country is, no doubt, due in part to a difference in local conditions, but is more largely due, perhaps, to the method of observation and the interpretation of results. The finding of the oldest lesion in the lung does not, in my opinion, at all indicate that infection was through the respiratory tract. In our work at the laboratory of the State Live-Stock Sanitary Board we have been repeatedly struck with the extensive involvement of the lungs in cases which were infected by feeding, when the intestine of the same animal showed either very slight lesions or no lesion whatever.

Among the specimens in the exposition you will find several which illustrate this point. You will see there the intestines and lungs of two monkeys which were infected by feeding with pure cultures of tubercle bacillus in a series of experiments on the comparative virulence of the human and bovine bacilli. In both the lungs are extensively diseased. We were unable to find any lesion

whatever in the intestine of one, and in the intestine of the other (A 45,007) there was only a slight lesion, with enlargement and caseation of three of the glands in relation to the upper part of the tract. There was found, however, enlargement and caseation of the cervical lymphatic glands, indicating infection through the tonsils or some part of the throat, a method of infection which is more frequent in children than generally believed. If these two specimens were shown without any history, most pathologists would put them down as instances of respiratory infection, yet they were kept under conditions which precluded the possibility, and were tested with tuberculin before the experiment began. You will see also the lung of a cow showing cavity formation. This animal was also infected by feeding, and in spite of the extensive involvement of the lungs, no injury could be found in the intestinal tract. Lastly, you will find the tonsils of a pig showing deep ulceration, and the lungs of the same animal, which are thickly sewn with tubercles. This pig was one of four, two of which were fed human and two bovine tubercle bacilli. All of them contracted general tuberculosis, most marked in the lungs, and ending in death. Three of the four presented lesions similar to the one shown, while in one only could any injury of the intestine be found. In three the cervical and mediastinal glands were markedly involved.

I am prepared to go even further than this, and hold that even when infection takes place through the intestine we may have the first and oldest lesion show itself in the lung. The late Professor Nocard, while collecting a serum from horses for culture medium, found that if he collected his blood at a certain period of digestion his serum would become contaminated even if he divided it into small lots of 100 c. c. each. On the other hand, if collected during fasting, he could preserve his serum in liter flasks without the loss of a single one. In seeking an explanation for this two of his assistants, Desoubry and Porcher, found that if they fed dogs with soup containing a considerable amount of greasy material, and then collected the chyle during digestion, they would find many colonies of bacteria in plates made from this material. On the other hand, when they gave the dogs a plain bouillon without grease no bacteria whatever would be detected in the chyle. During the past winter at the laboratory of the State Live-Stock Sanitary Board we have carried out similar experiments. We would keep a dog under observation some days to determine that it was entirely healthy. Then a purge of castor oil was given to

clear out the intestine, after which the animal was fasted for twenty-four hours. At the end of this time a single meal consisting of equal parts of melted butter and warm water made into an emulsion, in which tubercle bacilli were stirred, was given. After three to four hours, during active digestion, the dog was chloroformed, and as much chyle as possible collected, together with the mesenteric glands. The intestine of the dog was in every instance examined throughout, and in two animals microscopic sections were made from several portions of the intestines. In all cases they were found to be entirely normal.

In ten animals experimented on we found tubercle bacilli in eight, showing that the tubercle bacillus can pass through the perfectly healthy intestine without leaving any trace, and this takes place in a very short space of time. When we remember that the chyle goes directly into the thoracic duct and is thrown into the circulation near the heart, from which it passes to the lungs immediately, we can understand that infection through the intestine may readily show itself first in the lung. I have here a photograph of the organs of a guinea pig inoculated with the material from one of these dogs, which, I think, justifies me in saying that tubercle bacilli pass through the intestine in large numbers. The extent of involvement in this guinea pig shows, I believe, that the material with which it was inoculated contained many tubercle bacilli. When an observer tells me he has found no evidence of primary intestinal tuberculosis I ask him to explain the large number of cases of mesenteric involvement and of peritoneal infection, which must have taken place by the passage of tubercle bacilli through the intestine, although the intestine itself may show no injury. Professor McFadyean, of the Jenner Institute, has recently published a paper bearing on this point and bringing out a fact of great interest. In a comparative series of experiments he fed some monkeys bovine tubercle bacilli and some human. Those infected with bovine material showed no intestinal involvement whatever, but general infection of the lungs and abdominal organs, whereas those fed with human material showed intestinal involvement, together with infection of the other organs of the body. This point needs to be investigated further, but so far as it goes indicates that the bovine tubercle bacillus passes the intestinal wall without producing lesions, whereas the human tubercle bacillus in passing leaves a mark of its effect. In the experiments done by myself the bovine tubercle bacillus was used in the eight successful cases.

Perhaps the strongest evidence we have of the infection of human beings by the bovine tubercle bacillus is the finding of bovine tubercle bacilli in the intestines of children who have died of intestinal tuberculosis. The first of these cases reported was from the laboratory of the State Live-Stock Sanitary Board, the material having been sent by Dr. Alfred Hand, of the Children's Hospital in Philadelphia. His pathological report stated that it was the clearest case of intestinal tuberculosis that he had ever seen. The organism was isolated in pure culture, and found to correspond in every way with the bovine tubercle bacillus. It proved fatal to two calves in seventeen and twenty-seven days, respectively, and a six-year-old cow succumbed in seventeen days This organism was sent to Dr. Theobald Smith, who examined it by his recently-described method of cultural differentiation. He pronounced it to be the bovine organism.

Dr. Smith has added his name to the list of those who have found the bovine tubercle bacillus in the intestine of children. During the past year Dr. de Schweinitz, of the Bureau of Animal Industry, has found two cases in which the infection was evidently of bovine origin, as judged by the virulence of the bacillus isolated for cattle, the test proposed by Koch. In Europe Febiger and Jensen have reported three such cases, and the Commission of the Imperial Sanitary Office of Germany, as before stated, has found four cases out of sixteen examined.

We may pause here a moment to consider the report of this commission, which is remarkable. Cultures were obtained from thirty-nine sources, twenty-three of which were adults and sixteen children. There were nineteen cases of pulmonary phthisis, four cases of bone tuberculosis, two cases of cervical adentitis, one case of genito-urinary tuberculosis, six cases of miliary tuberculosis, and seven cases of the digestive tract. Of the thirty-nine cultures examined nineteen produced no lesion in cattle, nine caused a slight enlargement of the glands of the shoulder, without tendency to generalization; seven a somewhat more marked involvement of this gland, while four, all obtained from children, caused a generalized infection. Two of these four cases are described as "miliary tuberculosis," beginning from a bronchial adenopathy and a mesenteric adenopathy, respectively, while the remaining two were cases of intestinal tuberculosis. The cultures from the last two showed a very intense virulence for calves.

The commission points out that two of these four children did not die of tuberculosis, hence they conclude that in only two out

of the thirty-nine cases are they able to say that infection with the bovine tubercle bacillus has caused fatal tuberculosis in man. It is difficult to see the force of such reasoning.

Thus from the camp of the enemy, if I may use such a word for a scientific discussion, where our aim is only to know the truth, we obtain the strongest evidence that bovine tuberculosis is transmissible to man. We must either admit that all of these were cases of bovine infection of children or we must say that the human and bovine bacillus are one and the same. From the hygienic standpoint it makes very little difference which view we take.

Professor Orth, in answer to the report of the commission, places different interpretation on their results, and one which appears more rational. He holds that the seven animals which showed marked involvement of the lymph glands of the shoulder should be considered as infected with human tuberculosis; that the infection was not more grave proved only that in cattle, as in man, tuberculosis may undergo spontaneous cure. Of the thirty cultures studied, he considers that eleven, or 28 per cent., were virulent enough to infect cattle.

There remains but one more consideration, and that is the information to be obtained from the study of the tubercle bacilli derived from different sources, and credit belongs to an American, Dr. Theobald Smith, for having demonstrated the difference in cultures obtained from human and bovine sources.

The human tubercle bacillus is much easier to obtain in pure culture than the bovine. In the first generation a luxuriant growth will often take place, and generally subcultures can be obtained on glycerine agar from the first generation. The bovine tubercle bacillus, on the other hand, grows very slowly and scantily in the first generations. Cultures for several generations show only an exceedingly thin layer on the surface of the medium, oftentimes resembling ground glass. Some cultures require six to eight months before enough growth can be obtained with which to inoculate animals. Growth on glycerine agar will take place only after the organism has been cultivated for several generations on blood serum. Some cultures which I have isolated have required a year before a growth on glycerine agar would take place.

The staining characteristics of the two organisms are somewhat different. The human bacillus is long, slender and shows beading, whereas the bovine bacillus is thick, shorter and stains evenly. I do not feel, however, that a positive diagnosis can be made between the two organisms by the characteristics just given. The

chief difference between them is their virulence. The bovine tubercle bacillus has a pathogenic power tremendously in excess of that shown by the human bacillus, and this holds true for all experimental animals which have been tried, with the exception, perhaps, of guinea pigs and swine. These two animals are so susceptible to both types of the bacillus that is hard to draw a distinction. The animals experimented on include horses, donkeys, sheep, goats, dogs, cats, rabbits, guinea pigs and monkeys. There is absolutely no case in literature, so far as I am aware, in which one single animal has been found to be more susceptible to the human tubercle bacillus than to the bovine. This greater virulence of the bovine tubercle bacillus is shown by whatever method of inoculation we use.

As said by Villemin, man shares with cattle the sad privilege of perpetuating tuberculosis. Would it not, then, be an anomaly for man, who is acknowledged to be one of the most susceptible of all animals, to be an exception to this general rule of increased virulence of the bovine bacillus? If all other animals excepting those which are equally susceptible to them both succumb more quickly to the bovine bacillus than to the human, would it not be strange for one of the most susceptible of all animals to show an immunity to the most virulent form of tuberculous virus known? Our nearest relative, the monkey, also shows this greater susceptibility to bovine infection in a marked degree, as proved by De Schweinitz, De Long, at the laboratory of the State Live-Stock Sanitary Board of Pennsylvania, and by others. Therefore I feel that we are justified in concluding that this greater virulence probably holds good for man also.

In concluding, I wish again to call attention to one point, which by itself alone proves that bovine tuberculosis is a factor in the spread of the disease in the human race, namely, the finding of the bovine tubercle bacillus in the intestinal tract of children. On this ground alone we may rest the case, even if there were not so much corroborative evidence. The proportion of cases in which this finding has been made is large, though exact figures are not at hand. The German commission found the bovine bacillus in four out of sixteen cases examined; De Schweinitz has found it twice in four cases, and at the laboratory of the State Live-Stock Sanitary Board I have found it in two out of five cases examined.

We are, then, justified in saying that bovine tuberculosis is transmitted to the human race, chiefly to infants, in a certain proportion of instances, and is, therefore, a menace to human health. Our

present knowledge does not enable us to define exactly the extent of the danger, but that it exists cannot be denied. It is, therefore, the duty of physicians and officers of health to take every precaution against the infection of many by tuberculous cattle and their products.

[Reprinted from Maryland Medical Journal, February, 1904.]

SOME OBSERVATIONS ON THE TUBERCULOSIS OF ANIMALS.

By D. E. Salmon, D.V.M.,
Washington, D. C.

The tuberculosis of animals is a subject of very great importance from more than one point of view. To the agriculturist, the economist, the statesman, it causes, or should cause, anxiety because of the loss of food-producing animals which it occasions and because of its tendency to counteract the efforts of breeders to improve the quality of such animals; to the physician and sanitarian it must be a matter of grave concern because of the possibility of its having an injurious effect upon the public health; to every citizen who possesses the finer feelings developed by civilization, intelligence and cultivation it must be a matter of some solicitude as to whether the steak which he eats for his breakfast was cut from the carcass of a steer affected with generalized tuberculosis or whether the milk which he drinks with his luncheon was produced by a cow having tuberculosis of the udder. However, in the remarks which I have the privilege of making before this audience I shall treat the subject of animal tuberculosis from a medical point of view, with especial reference to the lessons of comparative pathology.

There are two questions of superlative interest before the medical profession at this time relative to animal tuberculosis. First, is animal tuberculosis communicable to man? Second, in case it is communicable to man, how frequently does such transmission occur?

Clinical observation has not been able to give us satisfactory answers to these questions, and experimentation has been forced to approach them by more or less indirect routes which necessarily has made the evidence obtained somewhat inconclusive and liable to more than one interpretation. It appears, however, that some rays of light are beginning to penetrate the obscurity, and that all must soon agree upon the answer to the first of the questions which I have just formulated. The second question cannot be answered definitely for a long time to come.

WIDE RANGE OF ANIMAL SPECIES AFFECTED WITH TUBERCULOSIS.

In the whole list of infectious diseases of animals there is probably not one which affects a larger number of species, or species

which are more widely separated as to the position which they occupy in the scale of animal life, than tuberculosis. Not only does it affect most mammals, such as man, monkeys, horses, cattle, sheep, swine, goats, dogs, cats, guinea pigs, rabbits, mice, rats, camels, zebras, giraffes, deer, bear, lions, tigers, jackals, panthers, leopards, foxes, etc., but it affects birds, such as poultry, pheasants, pigeons, parrots, canaries and other species, and it also affects fish, frogs and snakes. It is most remarkable that a bacillus which has proved so difficult of cultivation in the laboratory has been found capable of causing disease in fish, reptiles, amphibia, birds and mammals. The difference in chemical composition, and, above all, in temperature, between birds and fish, from a bacteriological point of view, is tremendous, and yet it is conclusively established that both may be affected with tuberculosis and that the etiological factor in each case is Koch's bacillus.

THE COMMUNICABILITY OF TUBERCULOSIS BETWEEN DIFFERENT SPECIES OF ANIMALS.

The communicability of tuberculosis between numerous species of mammals has been experimentally demonstrated. I shall not undertake to give an exclusive list of such species, as a brief statement is sufficient for the purpose which I have in view at this time. The infection of rabbits and guinea pigs with both human and bovine bacilli is a common experience. Koch successfully inoculated field mice, white rats, rabbits, cats, and a marmot from the ape. De Schweinitz infected apes with both human and bovine tuberculosis. Dogs and pigs have been infected with both human and bovine bacilli by several investigators. The horse, goat, sheep and cat have been readily infected with bovine tuberculosis. Mohler has infected goats with human tuberculosis. Theobald Smith infected guinea pigs from the nasua, and guinea pigs and rabbits from swine. De Jong infected goats with both human and bovine tuberculosis. Courmont and Dor infected fowls with material from both human and bovine sources, and also guinea pigs and rabbits with avian tuberculosis. Fish, frogs and other cold-blooded animals have been infected with both human and bovine tuberculosis in the experiments of Dubard, Dieudonné, and Herzog. Bovine animals have been infected with bacilli from human sources by Ravenel, De Schweinitz, Mohler and Theobald Smith in the United States, and by De Jong, Delépine, Orth, Stenström, Fibiger and Jensen, Max Wolff, Nocard, Arloing, Behring, Dean

and Todd, and others abroad, notably by the German Tuberculosis Commission as reported by Kossel.

Not all attempts to infect one species of animals with tubercle bacilli obtained from a different species of animals are successful; indeed, failures often occur in attempting to inoculate tuberculosis from individual to individual within the same species. These differences in results have been due to three causes—1. Variation in the number of bacilli inoculated; 2. Variation in the virulence of the bacilli inoculated; 3. Variation in the resisting power of the animals used in the experiments. In the latter experiments bacteriologists have taken precautions to administer uniform doses of bacilli, so that the first factor mentioned as tending to produce variable results has been to a great extent eliminated. However, the difference in the pathogenic activity of bacilli from different sources and the varying power of resistance possessed by different individuals of the same species, and to a greater degree by individuals of different species, are factors which must always have an influence upon the result, and must, for that reason, always be taken into account.

The important problems in the great subject of tuberculosis are not so simple that they can be solved by an experimenter who ignores the work of others and starts out with a few cultures of bacilli and a few experimental animals to settle the whole question by himself and on his own lines, as some enthusiastic gentlemen have discovered during the last few years. All lines of experimentation must be considered, and where there is an apparent lack of harmony the reason for it must be discovered before dogmatic conclusions are promulgated. Above all, we should endeavor to discriminate between positive and negative results, and not make the mistake of ignoring or suppressing the experiments which demonstrate something, in order that we may accept the, perhaps, more numerous ones which have not succeeded and which are absolutely barren as a source of information. The field of comparative medicine is a broad one, and it is the part of wisdom for those engaged in human medicine to look to it for the solution of those difficult problems which have so long eluded their grasp.

DIFFERENCES OBSERVED IN THE TUBERCLE BACILLUS FROM DIFFERENT SOURCES.

The study of avian tuberculosis throws considerable light upon the subject of the variation of the tuberculosis virus. This type of bacilli obtained from certain birds is very virulent for fowls,

while it is extremely difficult to infect fowls with human tuberculosis. Dogs are refractory to the avian bacilli, but are quite susceptible to the human; guinea pigs are extremely susceptible to human bacilli, but in a majority of instances resist the avian; and, strangely enough, rabbits appear to be equally susceptible to the avian and the human types.

The human bacillus, as is well known, grows between the temperature limits of 30° and 40° C., while the avian is able to grow between the limits of 25° and 45° C.—that is, the avian is able to grow through a range about five degrees higher and five degrees lower than the human bacillus. The cultures of human tuberculosis appear dry, scaly or verucose, dull and hard; those of the avian are moist, oily, wrinkled and soft. The human bacillus does not vegetate at all at 43° C., while the avian multiplies rapidly and abundantly at that temperature. The avian bacilli are longer, thinner, and more granular than the human bacilli.

An equally interesting type of tubercle bacilli was obtained by Dubard from tubercular carp. This bacillus was able to vegetate between the temperature limits of 10° and 37° C.—that is, it could not grow at as high a temperature as the human by three degrees, but it could grow at a point twenty degrees lower. It is very vigorous in its development, the rods at first being short and broad, but in cultures growing into long-branched filaments. On veal-broth agar, after twenty-four hours' vegetation at ordinary temperatures, there existed a visible trace of the culture, which by the twelfth day became white, smooth and shiny like the avian.

Another extremely interesting type of the bacillus tuberculosis was described by Friedmann, having been obtained from a tuberculous turtle. This bacillus was able to vegetate even at the freezing point, and the temperature limits of its growth were placed by the observer at 0° to 43° C. It was, therefore, able to grow at a temperature even higher than the human bacillus and at thirty degrees lower. Friedmann says that, as A. Kayserling correctly points out, it is often impossible to establish morphological differences between the individual bacilli in pure cultures of various kinds of tubercle bacilli, such as human, avian, piscine and blindworm, yet he found from many preparations made from pure cultures that the bacilli of piscine, blindworm and frog tuberculosis were considerably shorter and usually thicker than the human and bovine or the turtle bacilli, even when the latter were grown at the lower temperatures.

These examples of tuberculosis affecting animals which differ

so remarkably from each other, and these tubercle bacilli which vary considerably in their morphology, and even to a greater extent in their cultural characteristics, have led pathologists to inquire if this tuberculosis of man and other mammals, of birds, of reptiles, of amphibians, of fish, was indeed one and the same disease. In fact, they have gone farther than this, and have seriously raised the question as to whether the human and bovine bacilli of the mammalian type produce an identical disease, and as to whether human tuberculosis can be made to infect bovine animals or bovine tuberculosis to infect man.

These questions are very important, since they indicate a possible source of human infection, which, if demonstrated, would require special sanitary regulations for its suppression. There is a great difference, from a prophylactic point of view, whether a disease is confined to one species of animals, which may be readily placed under supervision and control, or whether it affects numerous species, some of which are almost beyond our reach. If mankind is susceptible only to human tuberculosis, the problem of controlling this disease in the human species is greatly simplified, but if the infection of man occurs from animals, and particularly from the domesticated animals with which he is closely associated and which produce such an important part of his food supply, then new centers of infection must continually occur until this source of danger is eliminated. Direct experiments to show whether man can be infected with animal tuberculosis are, for obvious reasons, impossible, and the deductions from clinical observations are uncertain and often misleading. We must, therefore, form our opinions from our general knowledge of the behavior of tubercle bacilli as they are studied in different species of animals and under different conditions of environment.

Theobald Smith has devoted much study to human and bovine bacilli, and has pointed out differences which he considers sufficient to constitute distinct types. He says:

"With one exception (one out of seven) the human bacilli grew from the start much more vigorously than the bovine bacilli. With several the rapidity of growth was surprising. After two weeks these cultures appear as a whitish surface-layer of a pearly luster of varying thickness. The bovine cultures show more discrete colonies, or a thin, uniform layer, having the appearance of ground glass. This difference in the vigor of growth has, in general, maintained itself, with the slowly-increasing tendency of all cultures to multiply more rapidly.

"The size of bovine bacilli in the various cultures was quite constant. They were all quite short, usually about 1 to 1.5 m. long, more rarely 1 to 2 m. These measurements do not tend to change appreciably with prolonged cultivation. The bacilli are straight, not very regular in outline. Some are broader at one end than at the other; some broader in the middle than at either end, *i. e.*, spindle-shaped; some may be so short as to resemble oval cocci. With the human bacilli the form was not so constant. The earliest cultures of Sput. II, IV, V and VI contained forms from 1 to 2 m. long, hence closely approximating the bovine forms. Others may be longer from the start. In all, however, there is a tendency, not noticed among bovine cultures, to grow longer under artificial cultivation. . . . .

"In the earliest cultures, therefore, morphological differences are not necessarily characteristic, and cannot aid us in attempts at determining the origin of cultures. . . . .

"If we undertake to summarize the observations made with microscope and culture tube upon these bacilli, we somewhat hesitatingly formulate the following general statements:

"1. Bovine and other animal bacilli (except nasua, which is regarded as coming from man) grew less vigorously for a number of generations than the sputum bacilli. Sputum I is an exception, and is probably an atypical form.

"2. Bovine bacilli are much less influenced by certain modifications of the culture medium.

"3. Bovine bacilli tend to remain short; human bacilli are either more slender from the start or become so during cultivation."

Recently Smith has given another and perhaps more definite distinguishing feature between human and bovine bacilli. If ordinary bouillon prepared from fresh beef with 3 to 5 per cent. glycerine added be used, and if the acidity be made equivalent to about 2 per cent. of normal acid, phenolphthalein being the indicator, the reaction of the bouillon during the formation of the membrane approaches the neutral point or becomes slightly alkaline in the case of bovine bacilli, but remains acid in the case of human bacilli.

MODIFICATION OF THE MORPHOLOGY AND VIRULENCE OF TUBERCLE BACILLI BY CULTURE AND BY PASSING THROUGH VARIOUS SPECIES OF ANIMALS.

In the study of avian tuberculosis it was found that the great majority of inoculations of fowl tuberculosis to guinea pigs and

of mammalian tuberculosis from guinea pigs to fowls failed to infect. There were some who concluded that the disease could not be transmitted between these species. However, it was found that an occasional guinea pig when inoculated with avian tuberculosis would succumb, with generalized visceral granulations, and after passing through a number of mammals this bacillus of avian origin may become very virulent for the guinea pig, and even pathogenic for the dog, and at the same time may lose its virulence for the gallinaceæ. Cadiot, Gilbert and Roger succeeded in infecting fowls with tuberculosis of canine origin. A fowl which had been inoculated and fed with tubercular material from the dog was found at the autopsy to have granulations in the liver, spleen and kidneys, and tuberculous ulcerations of the intestine. The bacilli from this fowl seemed to have been modified somewhat and to have acquired the pathogenic properties which made a sort of intermediate type between the human and the avian. Another fowl, inoculated from the liver of the first, died at the end of one hundred and twenty-one days with tubercles at the point of inoculation and numerous granulations of the peritoneum, liver, spleen, ovaries and lungs. It had not entirely lost its original properties, however, for, inoculated upon a dog, which was killed at the end of three months, it caused the formation of tubercles in the liver, kidneys and the lungs. From subsequent investigations these authors conclude that by injecting horse serum into the abdominal cavity of fowls every ten days the natural immunity of these birds to mammalian tuberculosis is so greatly diminished that they can be almost invariably infected by inoculation.

Dubard, in studying the tuberculosis of carp, concluded that the infection was caused by the contamination of the ponds with tubercular material from the human subject on account of "the exact coincidence of the appearance and of the cessation of the disease of the fish with the appearance and the disappearance of contamination of the ponds by human tubercular products." This observation led him to make experiments in which, he says, he succeeded many times in producing the piscine type of tuberculosis by inoculating cold-blooded animals with pure standard cultures of the tubercle bacillus. He found all cold-blooded animals with which he experimented susceptible to human tuberculosis. The most susceptible were the gray lizards and frogs; the least susceptible were the adders and the voracious fishes. Král and Dubard state that one of them has demonstrated that the bacillus of Koch acquired, by passage through cold-blooded animals, the

property of developing at ordinary temperatures on all the laboratory media. At the same time these cultures, which have the greatest resemblance to those of ordinary tuberculosis, lose their pathogenic power for animals of constant temperature. The facility with which this modified bacillus grows, the rapidity with which it accomplishes its vital cycle (which appeared to the authors very complete), the dichotomic filamentous forms that it presents in the course of its evolution seemed to them an exaggeration of what occurs with the tuberculosis previously known. It was found that the maximum temperature at which it would grow was below 30°, and it was only after great difficulty that they succeeded in obtaining cultures at 37°. However, by proceeding progressively, they succeeded in conquering its repugnance to elevated temperatures. The same result might be obtained by inoculating lizards that are kept in an incubator. There is thus produced a select race which grows well at 37°. It is much more easily cultivated on a new soil than the human bacillus and is only slightly sensitive to variations of the acidity or alkalinity of the media, but is otherwise very sensitive to sudden changes of the chemical composition of such media. The closer this type is to its piscine origin the more it has the avian aspect; the farther away it is and the longer it has been cultivated at 36° the more it is like the human.

One of these authors, by starting with the bacillus tuberculosis piscium and passing it through a series of guinea pigs, obtained a tuberculosis which differed in nothing from the human in its cultural, morphologic, and pathogenic characteristics.

Herzog, in a recent publication, concludes from his experiments that the bacillus of mammalian tuberculosis loses its power to infect mammals when it is passed through the organism of cold-blooded animals. The longer mammalian bacilli are allowed to remain in the body of the frog the longer do guinea pigs live after they are inoculated with these bacilli. He says that Dieudonné was even more successful in similar experiments conducted by him. He found that of frogs inoculated directly with mammalian tuberculosis almost all survive; of the frogs inoculated from this first set of frogs a few die, the majority survive, while of the third group of frogs inoculated from the second group the majority die, a part survive. The bacilli are found to have undergone a great change morphologically; they are short and broad, and hardly to be distinguished from those of fish tuberculosis. The cultures, too, are very similar to the cultures of fish tuberculosis, and would

only grow between 22° and 30°. Attempts to obtain cultures at the maximum temperature mentioned had been unsuccessful up to the time of reporting. The bacillus was no longer pathogenic for guinea pigs.

Friedmann also found that the turtle bacillus when inoculated in guinea pigs in large doses produced true tubercles containing both giant cells and tubercle bacilli.

Comparative studies of human and bovine bacilli have been made by numerous investigators. In a recent article Wolbach and Ernst state with reference to their work:

"Rarely in the human cultures exceedingly large, round bodies, several microns in diameter, were found in branched bacilli at the point of junction of the three branches; still more rarely the center of this body was occupied by a round, unstained refractive body such as has been described by Fischel in the club swellings of the avian bacillus.

"With the exception of the last-described forms, which undoubtedly are degenerate, all those found in the human cultures were found in the bovine cultures, although with less frequency. Branched bacilli and the threadlike rods were found, while the small and large deeply-staining sporelike bodies were found in as great abundance as in the human cultures. In the cultures isolated by ourselves the average lengths were less than in the human cultures, rarely exceeding six to eight microns in length. In the bovine culture from Král exceedingly long threadlike forms were found.

"Remarkable as the changes described seem when we compare the two extremes—one the short rods, averaging about one micron in length, occurring on egg; the other the long filiform and branched bacilli, ten to fifteen microns long, occurring on brain—yet they are constant in their occurrence, and one extreme may be changed into the other at once by change of medium."

In their summary these authors say: "1. The tubercle bacillus undergoes marked changes in morphology with change of culture medium; 2. The microscopic characteristics of a fully-developed culture are fairly constant for each medium."

The rapidity with which the morphology of the tubercle bacillus changes when the cultures are made on different media indicates that it is possible to lay too much stress on the appearance of the rods as indicative of different types. As the body of an infected animal is simply a culture medium for the inoculated bacilli, we should infer from the laboratory experiments just mentioned that

bacilli from the same culture, if introduced into the bodies of animals of different species, might in each case develop different morphological characters. For this reason the morphology cannot be regarded as a very satisfactory means of distinguishing between tubercle bacilli from different sources. Indeed, in the same microscopic preparation we generally find both long and short rods, and it is sometimes difficult to say of which there are the most or what is the average length. I have recently been shown a photograph by De Schweinitz of two microscopic shreds from the same culture, one of which was made up entirely of short rods and the other entirely of long rods. Now, as the bacilli in each of these shreds appeared to reproduce their individual characteristics, it is quite likely that a culture made from one shred would have a very different appearance from that made from the other shred so far as relates to the morphology of the rods.

About two years ago, in order to study the changes which occur in tubercle bacilli grown under different conditions, I requested Schroeder to carefully inject some human tubercle bacilli into the udder of a dry cow. He therefore injected 40 c. c. of virulent human culture through the duct of the teat October 3, 1901, using a blunt canula and every precaution to prevent mechanical injury. This injection was followed by considerable swelling and induration of the affected quarter of the udder and by the secretion of 300 to 400 c. c. of a gray, syrupy fluid having a glistening appearance, in which were found numerous leucocytes, fat globules, and tubercle bacilli. There is still at this time (January, 1904) some induration of the udder, and the secretion containing tubercle bacilli has continued since the time of infection. It is quite remarkable that this human bacillus, which is not pathogenic for bovine animals, should have been able to maintain its existence and to multiply within the milk ducts of the cow for this long period of time. The virulence of the bacilli has been tested from time to time, but no material change in this respect has been demonstrated. Cultures on egg medium recently examined show that the colonies are easily broken up, and in this character resemble bovine cultures, but otherwise no change has been observed.

Pearson and Ravenel infected a calf with a human culture of moderate virulence by administering large and repeated doses. The animal lived one hundred and six days, and at the autopsy showed tubercles in the bronchial glands, liver, omentum, mesentery and lungs. A second calf inoculated from the first died in forty-eight days; a third calf inoculated from the second died in

twenty-three days, while the fourth and fifth of the series each died in twenty-four days. The authors believe not only that they succeeded in conveying human tuberculosis to calves by giving large and repeated doses of the culture, but that by successive passages through calves they brought about a marked increase in the virulence of this culture.

Theobald Smith, in commenting upon this experiment, says: "I am not prepared to accept this single experiment as establishing the possibility of an increase of virulence of the human variety of bacilli in cattle. In spite of all precautions, errors may creep in when a species eminently susceptible to the bovine bacillus is used, when the experiment extends over such a long period, and so much culture fluid is injected that freedom from errors can only be established by several concordant results. On the other hand, it is conceivable that in such an experiment indicating sudden increase in virulence the culture used may have been originally a bovine culture grafted upon the human subject and thereby attenuated. Such a culture would probably respond quickly to serial inoculations, whereas a true human type may not."

It is difficult to see why the increase of virulence in the human culture growing in the bovine body is any more improbable than the decrease of virulence of the bovine bacilli growing in the human body. Both hypotheses involve a marked variation of virulence, and such a variation is probably as likely to occur in one direction as in the other.

Hamilton and Young made a similar experiment, from which they conclude "that when tuberculosis from a human source has been ingrafted upon a calf it gains enormously in virulence by being reinoculated upon a second calf."

Arloing states that in the course of his investigations in 1884 and 1886 he increased the virulence of the material (tubercular) from certain surgical lesions by several successive passages through the guinea pig. In a certain number of cases this material, which at first infected only the guinea pig, finally became infectious for the rabbit. The most profound changes which he obtained were those which resulted from accustoming the bacilli to vegetate in the deeper layers of glycerine bouillon. The human bacillus, which before being accustomed to the bouillon produced tuberculosis in the rabbit and guinea pig by all the channels of inoculation, now presented special characteristics. It infected guinea pigs only with great difficulty, and very feebly by subcutaneous inoculation, and appeared without effect upon the rabbit

when introduced by the same channel. Injected into the rabbit intravenously, however, it produced a kind of septicemic tubercular infection, fatal in two or three weeks, without apparent tubercular lesions in the lungs. One might believe it dispossessed of its tubercle-producing power, but if introduced into the peritoneal cavity of the rabbit in proper dose it caused an extensive tubercular eruption on the omentum and on points of the mesentery and intestinal folds. If propagated for a long time in bouillon by successive cultures, it may recover, without known cause, a small part of its old virulence and cause an eruption of very discrete and very small tubercles in the lungs.

The intravenous injection of this bacillus with calves does not give rise to the same appearances, but the effects are no less remarkable. In fact, these inoculations determine very extensive infiltrations of the lungs, which cause death in a few weeks.

A bovine bacillus of normal virulence was also accustomed to grow in the deeper parts of glycerine bouillon, and after a few generations in this medium its virulence became modified. It was still very fatal for sheep and goats, but had become remarkably harmless for calves. The lesions which it caused in the lungs were also modified. In place of the usual granular eruption, it produced with sheep and goats massive lobular infiltrations scattered here and there in the lungs, having a gray color and a sarcomatous appearance on section.

A very interesting experiment has recently been made by Mohler in the Bureau of Animal Industry. Two cows, Nos. 300 and 312, were inoculated subcutaneously with tubercle bacilli obtained from human sputum. The inoculations were made after testing with tuberculin by the injection in front of each shoulder of 2 c. c. of normal salt solution containing tubercle bacilli in suspension. One of the animals, No. 300, received in this manner bacilli which had been cultivated artificially for five generations upon dog serum without passage through any intermediate animal other than the guinea pig first used to isolate the bacillus from contaminating organisms in the sputum. The other cow, No. 312, was inoculated with material from the same source originally, but instead of continued growth in the incubator upon dog serum, it had been passed successively through a series of seven rabbits. An emulsion of the axillary gland of the last rabbit was used for the injection. The rabbits succumbed upon the eighty-second, thirty-third, fiftieth, twenty-first, fifty-eighth, thirty-fifth and thirty-sixth days, respectively, after inoculation—an average of 46.5 days.

As a result of this comparative test it was shown at the autopsy of these cattle, held, respectively, 158 and 159 days after inoculation (both animals having been chloroformed), that the bacillus in the first instance had failed to produce any lasting tubercular lesion whatever, the autopsy being absolutely negative. The lesions present in the second animal, however, indicated that marked increase in virulence had occurred from the repeated passage of the tubercle bacillus through rabbits.

The clinical notes show that the animal's temperature had risen from an initial of 102° F. to 106° F. on the fourteenth day after inoculation, and that acceleration of respiration was noticeable. The temperature gradually receded, although it was variable from day to day. Later observation showed that there was at each point of inoculation a firm, hard tumor involving the adjacent prescapular gland. The autopsy showed on the right side at the point of inoculation a tumor the size of a hickorynut full of thick, yellowish pus. At the opposite seat of injection there was a tumor the size of a hen's egg full of caseous material and surrounded by an inflammatory area of granulation tissue. The right and left prescapular glands were enlarged and contained numerous foci of calcareous matter. The lungs contained twelve or more scattered grayish tubercular foci. The anterior and posterior mediastinal lymph glands were greatly enlarged and thickly studded with calcareous tubercular areas. The bronchial glands were the size of pigeon eggs and gritty on section. The liver contained some fifteen tubercular foci, both superficial and deep. The retropharyngeal, submaxillary, prepectoral, and portal lymph glands all contained small tubercular foci, and there were inflammatory fibrous neoplasms on the costal and diaphragmatic pleura and the omentum.

We have here a case of tuberculosis in a bovine animal produced by sputum bacilli, and the virulence of these sputum bacilli had been increased by passage through a series of rabbits, since other bacilli from the same source which had not been passed through rabbits failed to produce any disease when similarly inoculated upon a bovine animal.

Mohler has made similar studies with other culture of bacilli which were obtained from the human subject, but which had morphological and cultural peculiarities similar to those of bovine bacillus, although it only produced local lesions in cattle. This bacillus was passed through a series of five cats, and was then found to be completely changed in its morphological appearance,

the rods being elongated, slender, more or less beaded, and entirely of the human type. But far from decreasing in virulence, as might be expected from its morphological appearance, this bacillus had so increased in its pathogenic activity that it now produced generalized tuberculosis in a cow. This cow was inoculated subcutaneously in front of each shoulder with 2 c. c. of a salt solution emulsion of the tuberculous omentum of the last cat of the series. The cow rapidly lost flesh; had a temperature of 104° F., with the point of inoculation and adjacent glands greatly swollen. The autopsy revealed generalized tuberculosis, involving the lungs, mediastinal glands, spleen, liver and kidneys.

Other cultures of the tubercle bacillus obtained from the mesenteric glands of a sheep, a hog and a cow, when recovered from their original source and grown on dog serum, conformed to the bovine type in every particular, but after passage through several cats and recovery on dog serum a striking change was observed in their morphology, since they then showed elongated and slender rods more or less beaded and undistinguishable from the human bacillus. That there was no decrease in the virulence is indicated by the fact that the last cat in the series succumbed in a shorter period of time than the most of the cats in the same series, and always in less time than the average duration of life shown by the preceding animals of the series.

THE SIGNIFICANCE OF TYPES AMONG TUBERCLE BACILLI.

The successful results of experiments made with a view of modifying the virulence of tubercle bacilli obtained from different sources and having different degrees of activity are now so numerous, so positive, so concordant, that it is impossible to explain them away by the hypothesis of accidental contamination or by the suggestion that the cultures used had an origin different from what was supposed. Beginning with reciprocal transformations of the avian, mammalian, piscine, and amphibian bacilli, investigators have attacked the types which are less clearly defined, such as the human and bovine types, and have both reduced and increased their virulence for certain species of animals, and have modified their morphological appearance to such an extent that it is no longer possible to identify them by their form. What, then, is the significance of the word "type" as applied to tubercle bacilli of human, bovine, porcine, or canine origin? Is it not merely an aggregation of temporary characteristics which have been acquired

as the result of the vegetation of the bacillus for a time under certain definite conditions of environment?

When the differentiation of human and bovine bacilli was first undertaken the characteristic made most prominent was the much greater virulence for cattle of bacilli of bovine origin. It has since been proven, however, that bacilli equal in virulence to those of bovine origin have been obtained from the human subject, and it has also been proven that bacilli of no greater virulence than the average human bacillus have been obtained from the bovine subject.

According to Kossel the German Tuberculosis Commission recognized three degrees of virulence in seven cultures which it tested from cattle and hogs, and it also recognized four degrees of virulence in thirty-nine cultures from human sources. It is evident, therefore, that no specific degree of virulence can be defined as absolutely characteristic of either the human or the bovine bacillus. The most that we can say is that the greater part of the bovine bacilli are much more virulent for cattle, sheep, goats, rabbits, and perhaps some other animals, than are the greater part of the human bacilli. The investigations thus far made would seem to indicate that there are all gradations of virulence among tubercle bacilli of bovine origin as well as among those of human origin.

Another characteristic which was named with considerable confidence as a distinguishing feature was the morphological appearance of the rods when grown upon dog serum. Bacilli have been obtained from the human subject, however, which had the exact morphology that had been attributed to the bovine bacilli, and bovine bacilli have been changed by passing them through cats so that they acquired the morphology of the human bacilli. The length and breadth of the rods vary as they are found in the lesions of the same subject; bacilli of the same source vary greatly according to the medium upon which they are grown, and the individual rods of the same culture and growing upon the same medium also vary. While the greater part of the cultures from human sources which have been grown upon dog serum for a considerable time show rods which are longer and thinner than those of most cultures similarly made from bovine sources, there are notable exceptions to this rule.

Of the cultural characteristics about the same thing may be said. The most of them are far from constant, as may be noted, especially if we compare a number of bovine cultures and a number of human cultures each from a different subject. The reaction test

of the culture medium which has recently been proposed has not been investigated sufficiently to enable one to form an opinion as to its accuracy. There appears, *a priori,* to be no more reason to expect constancy in this character than in the others which have been suggested as a means of discriminating between bacilli from different sources.

It is undoubtedly true that tubercle bacilli tend to the production of different types corresponding to the medium upon or within which they are grown and to the conditions of environment to which they are subjected, and it is therefore to be expected that vegetating in any given animal species for a time they will present some special characteristics. These characteristics may be valuable in many cases as indicating the origin of a given culture, but they cannot be properly regarded as fixed and unchangeable, nor as indicating that such types are pathogenic only for the particular species of animal from which the type was obtained.

THE TRANSMISSION OF ANIMAL TUBERCULOSIS TO MAN.

Basing their conclusions upon the failure of the inoculations made by them to produce tuberculosis in bovine and other large animals with cultures of the human bacillus, and upon the morphological and cultural differences above referred to, some investigators have held that human tuberculosis differs from bovine, and cannot be transmitted to cattle, and that, on the other hand, it is doubtful if bovine tuberculosis can be transmitted to man. In order to reach these conclusions it was necessary to ignore the very positive results of Chauveau in infecting cattle with human tuberculosis and those of other experimenters who produced less extensive lesions in the inoculated animals. It was also necessary to put aside the clinical evidence of the infection of man with bovine tuberculosis, which, while not absolutely conclusive, was yet very strong, particularly the cases of accidental inoculations; and, finally, it would appear that the successful inoculations of mammalian tuberculosis upon birds, fishes and amphibians, and the counter-inoculations of avian, piscine, and amphibian tuberculosis upon mammals, had been lost sight of, or the authors in question would have been more cautious in putting forth such hypotheses; for surely, if the disease was transmissible between such widely-separated species as human and carp, it would be hard to believe that it could not be transmitted from human to bovine.

Since Koch's paper was read before the British Congress on Tuberculosis in 1901 numerous investigators have taken up this

question, and it has been shown conclusively that tubercle bacilli from the human subject may be so virulent as to produce generalized tuberculosis in cattle even when inoculated subcutaneously. It is not necessary for me to enter into details concerning the various experiments conducted by Vagedes, Ravenel, De Schweinitz, Mohler, De Jong, Delépine, Stenström, Fibiger and Jensen, Nocard, Max Wolff, Arloing, Behring, Dean and Todd, Hamilton and Young, the German Tuberculosis Commission, and by Theobald Smith, all of whom have succeeded in causing generalized tuberculosis in cattle by inoculation with bacilli of human origin. The German Commission, in testing thirty-nine human cultures, found four of these to be very virulent for cattle, which is approximately 10 per cent., but all of these cultures were included in the sixteen which were obtained from children, so that of the cultures from children tested 25 per cent. were virulent for cattle. The experiments of the above-mentioned investigators at once and forever disprove the conclusion that tuberculosis cannot be transmitted from the human subject to cattle, but the question has been raised as to whether this virulent tuberculosis obtained from man is really of human origin or whether it is bovine tuberculosis which has been grafted upon the human subject. If it be admitted that this is human tuberculosis, then it follows that cattle are susceptible to human tuberculosis, and the principal argument that has been used to show that bovine tuberculosis is not communicated to man falls to the ground. If, on the other hand, it be admitted that the subjects from which these virulent cultures were obtained were affected with bovine tuberculosis, then it follows, without further argument, that the tuberculosis of animals is an important factor in the causation of human tuberculosis.

It has been my object to impress upon you so far as I could in the brief time at my disposal how widely the disease which we know as tuberculosis is distributed in nature; how it has been observed in fishes, frogs, lizards, snakes, turtles, birds, and in a great variety of mammals; how it may be transmitted artifically from any one of these creatures to another far removed from it in the zoölogical scale; how the morphology and cultural characteristics of the bacilli from these different sources, though in many respects they show great variations, may be modified almost at the will of the experimenter by gradual adaptation to other animal organisms or to other conditions of environment; how different degrees of virulence and different morphological characteristics have been found which form a series of intermediate grades

between the most virulent bovine bacilli and the most attenuated human bacilli; how the virulence of bacilli from human sources has been increased by passage through rabbits, cats and calves until in each case it became very active for bovine animals, and how the test of inoculating bovine animals with bacilli from human sources has shown that a considerable proportion of such bacilli produce generalized tuberculosis in these animals, and thus exhibit a virulence which is not to be distinguished from that of tubercle bacilli from bovine sources. As a result of all this work we are looking at tuberculosis more and more from the point of view of general pathology; in other words, we are taking a broader view of these questions, and the little barriers which were raised to form a dividing line between human and bovine tuberculosis are melting away. We see one tuberculosis, one tubercle bacillus, with infinite variations, according to its habitat, whether that habitat is an artificial culture medium or an animal organism, and, notwithstanding these variations, a bacillus which is always essentially the same, and one which may at any time, if given suitable conditions, retrace its steps and recover the properties which it possessed before the variations occurred.

Now a word as to the practical lessons which we should obtain from these scientific investigations. A great and successful effort is being made to reduce the suffering and mortality which results from human tuberculosis. Rooms occupied by consumptives are disinfected, the sputum is destroyed, expectoration in public places and on the sidewalks is prohibited, sanatoria are being established where those afflicted with the disease may be properly treated without endangering other members of the community, and so, one by one, the channels of infection between man and man are being brought under control or abolished. The good effects of this work are already seen in the reduction of the mortality from tuberculosis in the places where it has been going on. But why should we ignore the channels of infection between animals and man? There is a tremendous amount of tuberculosis in cattle, particularly in milch cows and in pigs, and the infrequency of the disease in these animals is increasing from year to year. Why should we continue to allow milk to be sold and to use it ourselves if it is produced by herds where 50 to 90 per cent. of the cows have tuberculosis? Why should we continue to allow tuberculous animals to be slaughtered practically without supervision in numerous abattoirs and the meat sold for human consumption without restriction?

There are two answers to these questions. The first is that the work is progressing along the lines of least resistance, and the second is that the medical profession has never appreciated, and does not now appreciate, the importance of animal tuberculosis as a factor in the production of human tuberculosis. This fact is as plain as the noonday sun to anyone who has watched the development of medical sentiment, as I have, for nearly a third of a century. When the experiments of Villemin demonstrated the infectiousness of tuberculosis, and veterinarians called attention to the danger of infection from animal sources, some twenty-five years ago, we were told that tuberculosis was plainly an hereditary disease, and that if it was infectious from man to man or from animals to man there would be plenty of clinical evidence to that effect. But time ran on, the bacillus tuberculosis was discovered, and the profession reversed its theory that tuberculosis was exclusively the result of hereditary influence. It was soon seen that the problem of controlling this disease, which before had been hopeless, was now comparatively plain, at least so far as principles of administration were concerned. And there were many who wondered why it had taken so long to discover clinical evidence demonstrating the infectiousness of the disease between man and man when such cases had been occurring everywhere in abundance from time immemorial.

There has been almost to the present moment just as strong a prejudice against the theory of infection from animal sources as there was formerly against the theory of infection from human sources. Clinical evidence indicating infection from animals has been ignored, explained away, or summarily rejected, just as similar evidence as to infection from man to man was disposed of before the discovery of the tubercle bacillus. And as the evidence of infection from animals multiplied and could be no longer entirely ignored the attempt was made to neutralize it or hold it in check by the erection of scientific barriers. The promulgation of the idea that human tuberculosis was not transmissible to cattle and that human and bovine bacilli were distinct types, with well-defined characteristics, started this movement, which culminated at London in 1901 with Koch's memorable address before the British Congress on Tuberculosis. In that address he took the most radical position in advancing the difference between human and bovine tuberculosis and the improbability of the disease being transmitted from animals to man. Since that time, as has already been shown, the conclusions from his experiments have been dem-

onstrated to be incorrect; the disease has been again and again transferred from man to animal, and bacilli of the bovine type have been frequently found in the lesions of the human subject. What are we going to do now? Will we try to find some other reasons for neglecting our plain duty in this matter, or will we try to control this source of infection as well as the other sources?

The frequent infection of the human subject with animal tuberculosis appears to be established by the scientific investigations to which reference has been made. It is notable that most of the cases having bacilli of the bovine type have occurred in children. Each of these cases forms a new center of tuberculosis infection. And it is to be remarked that these bacilli of the bovine type are pathologically very active; they are more virulent for most animals and probably more virulent for man than are the bacilli of the human type. Therefore it appears that these new centers of tuberculosis may be the means of keeping up the activity and virulence of the disease in man. It is a striking fact that human bacilli are generally much more saprophytic in their characters and far less virulent than those of most other mammalian sources, and it seems that the human organism has the power of attenuating these bacilli and gradually making them less and less harmful. But this influence for good must be continually counteracted by the infusion of extremely pathogenic germs from animal sources.

It is not my purpose to discourage in the least any of the efforts being made or contemplated for limiting the danger of infection from the tuberculous human patient, but I insist that it is also the sanitarian's duty to guard against infection from tuberculous animals.

[Reprinted from Maryland Medical Journal, March, 1904.]

ON FACTS, HALF TRUTHS AND THE TRUTH, WITH SPECIAL REFERENCE TO THE SUBJECT OF TUBERCULOSIS.

By J. George Adami, M.A., M.D.,
Professor of Pathology, McGill University, Montreal.

Two centuries ago, or very little more, it was possible for the diligent student to be intimately acquainted with not merely all the learning of his own epoch, but with the accumulated lore of the ages. That time is past and gone, never to return. To-day, so vast is the accumulation of facts that have been garnered in every department of human interest, that to keep abreast of all the advances being recorded in any large branch of science is a vain dream. The diligent student, it has been said, cannot nowadays hope ever to be a completely-equipped biologist. To be a master in any main branch of biology—an all-round zoölogist, botanist, or paleontologist—is not to be thought of. The wise man knows that it is impossible to be an authority upon a half-section of any one of these branches—upon the zoölogy of the invertebrata, for example. All that is known regarding any one of the important divisions of the invertebrata it is beyond him to master. The arthropoda, for example, constitute quite too extensive a subject. It is indeed within the bounds of possibility that a man of the highest capacity may become a fairly-equipped entomologist, but if he values his reputation he will not attempt so large a task. To be a coleopterist, a master in beetles, should be his highest ambition. The sensible man should be satisfied if he can make an abiding mark as a scarabæist.

And so it is in medicine. We have reached with a vengeance the days of specialism, and so great is the outpouring of facts and of new articles regarding even the one subject of tuberculosis that it is impossible for anyone to pose as an authority upon this subject unless his whole time be devoted to it. Thus, for example, it would be futile for me as a teacher of general pathology to pretend to be an authority upon tuberculosis, nor do I come before you as such. Indeed, but for the insistence of our friend, Dr. Osler, I should not be upon this platform. With no new facts to bring before you, no record of personal observations to announce, I was, I confess, in a quandary. Thinking over the problems of tuberculosis which one

might with profit discuss, and recalling recent work and the present situation of affairs—the absolute divergence of opinion of men known and accepted as accurate observers, the sure statement of one set of workers flatly contradicted by the conclusions of other sets—it occurred to me that it might possibly be of use to take for my text the old, old warning, a warning that appeals especially to medical men, coming as it does from the father of medicine himself—that experience is fallacious and judgment difficult; to point out how in the past, the very recent past, in connection with this subject of tuberculosis experience has proved fallacious; how that during the last twenty years conclusions which appeared to be absolute and sure, based upon exact observations, have been proved to be faulty, or at least imperfect, and how, therefore, it is the part of a wise man to have an open mind and to be prepared to find that what he had regarded as settled may, through fuller knowledge, become unsettled; to weigh evidence with the greatest care and to be most cautious in arriving at conclusions.

I shall have to go over what to most of you may be familiar ground, and in doing so I trust that I shall not tire you. In these days of active advance it is good at times to look back, good to call to mind the previous mistakes, so as to be guarded against falling into like errors in the future. I shall not venture to go into details, but will attempt merely to outline some of the episodes in the history of our knowledge of tuberculosis during little more than a generation. This year the bacillus, does, as it were, attain its majority, but in the years preceding its discovery the nature of tuberculosis was a matter of angry discussion.

Many here present—perhaps the majority, so short is the history—can remember as I do the time when the infectious nature of tuberculosis was strenuously denied by most medical men. How long ago that seems to us now! Yet in '80 and '81 the communicability or non-communicability of the disease was being fought over in medical associations. Years previously, by Klencke in the forties, Villemin in the sixties, and Cohnheim in the seventies, this communicability had been clearly demonstrated, but the majority of our profession still supported the older view of diathesis, and were strengthened in their position by the observations of Burdon-Sanderson and others that non-tuberculosis material similarly inoculated under the skin would set up lesions which were the same as those caused by definitely tuberculous matter. The observers who reported such developments were of recognized standing, and as their views supported the prevalent

belief, their experiments were accepted until the specific bacillary cause of the disease was demonstrated beyond possibility of cavil. Those observers who opposed Villemin and Cohnheim were honest, and, what is more, up to a certain point their observations were correct. Relatively inert foreign bodies introduced into the tissues will set up a local subacute disturbance. There is inflammation of the surrounding parts, infiltration with leucocytes, local cell multiplication, and even the occasional presence of giant cells so characteristic of the true disease. To us, with more accurate histological knowledge, it seems absurd that the two processes should ever have been confounded, the differences which we can recognize between the inflammation around foreign bodies and the tubercles proper are so considerable.

Twenty-five years ago, however, these distinctions were little known. At that period our profession as a body was in the same state of uncertainty regarding the nature of tuberculosis as it is at the present moment regarding the nature of cancer and malignant growths.

This, perhaps, is not the best illustration of my text that could be given, yet here experience was fallacious and judgment rendered difficult by false deductions from experimental evidence. The facts were there, but were wrongly interpreted, and progress was retarded.

The next great step forward was Koch's memorable discovery of the bacillus. His classical publication upon the subject is more to the point. We might epitomize his pronouncement thus (I modify for present purposes a well-known passage in Sternberg's Bacteriology):

"I have found the bacilli in every one of nineteen cases of pulmonary phthisis, whether in the sputum, in fresh, cheesy masses, or from the interior of recently-formed cavities; in tuberculous ulcers of the tongue, in tuberculosis of the uterus, testicle, etc., in twenty-one cases of scrofulous lymphatic glands, in thirteen cases of tuberculous joints, in ten cases of tubercular bone affections, in four cases of lupus, in seventeen cases of grape disease in cattle. I have made inoculations into two hundred and seventy-five guinea pigs, one hundred and five rabbits, forty-four field mice, twenty-eight white mice, eighteen rats, thirteen cats, as again into dogs, pigeons and chickens. These bacilli are not to be found in healthy tissues nor in the sputa of healthy persons or in diseases of other orders. There is one common factor in the formation of tubercles in all these different forms of disease and in all these

different species of animals. In the tubercles there are present micro-organisms—bacilli—having identical staining reactions. These bacilli inoculated into the animals of the laboratory reproduce the condition of tuberculosis. Therefore, the one organism, the bacillus of tubercle, is the cause of a disease common to a great number of warm-blooded animals. That disease can be and is transmitted from one species to another.

Do not misunderstand me. These are not the actual words of Koch, but they give, I think, correctly his facts and the inferences that were universally drawn therefrom, and his definite statement that human and bovine tuberculosis were identical was accepted on all hands. He afforded us an extraordinary array of facts, and it is doubtful whether before or since, such a masterly array has or had been produced in connection with any one biological problem. But, despite all this familiar knowledge, he did not attain to the whole truth. What we have been fighting about during the last few years in its essence resolves into the determination of what proportion of the whole truth is attained in these primary conclusions. Let us here emphasize that it is not a question regarding the accuracy of the facts adduced by Koch. Each fact adduced by him has been abundantly confirmed. All the same, the conclusion reached by him is only a half-truth. Other facts since determined have modified his conclusions. To express it briefly, the bacilli obtained from other forms of the disease in other species of animals, while in the main transmissible to animals in the laboratory—to guinea pigs, for example—have not been found in any case mutually transmissible under ordinary conditions of experiment. While certain features were common to all, differences have been found—minute differences in shape, differences in rate of growth outside the body, differences in virulence towards individual species. Even as regards the very susceptible guinea pig, the rate and extent of the development of the disease has been found to vary. This, as I say, is old and well-established history, but for present purposes it is worthy of reference as establishing the domination, if but for a few short years, of half-truths.

It will be remembered that Mafucei, Strauss and others demonstrated that the bacilli obtained from birds, the victims of tubercular disease, differ from those obtained from human sources, that they are longer, grow more abundantly on the media of the laboratory and that at a somewhat higher temperature limit, and are not pathogenic to dogs, while contrawise the tubercle bacilli have no effect upon fowls, and that forthwith it was concluded by some

at least that here we had to deal with two distinct species of tubercle bacilli—a most important conclusion, if true, for it opened the way to the possibilitity of specific distinctions being present between the tubercle bacilli obtained from other species of animals.

It seems all so clear: The bacillus isolated from birds has distinctive characters differentiating it from the human tubercle bacillus. There is a definite fact, and so far as it goes, incontrovertible. The conclusion to be drawn therefrom would seem obvious: we have to deal with two species, closely allied, it may be, but nevertheless distinct, that is, if we accept, as we seem bound to, that the only feasible plan in connection with these minute forms of life is to regard as separate species forms which exhibit constant differences. The facts are true—the conclusion is not true.

We all know how Rouse and Nocard (1898) removed the difficulty and demonstrated the truth, showing that, by accustoming the human bacilli to live within the bodies of birds, these can, in the course of several months, modify their characters so that now they assume the properties and virulence of the avian species—observations of fundamental importance and basal, as throwing light upon the solution of some of the most important problems that bear upon the propagation of the disease in man. It is now agreed upon all hands that the tubercle bacilli are capable of modification by passage through a succession of individuals of one species. The present crux is the extent to which the modification takes place, more especially in connection with the bacilli which have undergone passage through cattle. And much depends upon the right answer to this question. Koch's early researches, if they mean anything, mean this, that there is the gravest danger to be apprehended from the ingestion of infected food products obtained from animals suffering with active tuberculosis, and in various countries special legislation has been enacted to prevent the use of such infected material. Bearing in mind these newer facts, has there been a false alarm, and is it necessary or is it not to enforce the legislation? From being purely a scientific question, it will be seen immediately that this is a question of wide economic importance.

It was in this country by Frothingham, Theobald Smith and Dinwiddie that the question of the absolute identity of the human and bovine bacilli was first actively raised and clear evidence of the non-identity was brought forward. But undoubtedly Koch in his famous address on Tuberculosis at the Congress in London

in 1901, was the first to make this a live matter. Koch's main argument in that paper may be given as follows:

Tuberculosis in cattle is very common and tuberculous mammitis with the presence of enormous numbers of tubercle bacilli in milk is not infrequent, at least, in European countries.

If bovine tubercle bacilli were virulent for man, then, more particularly young children drinking such milk should show frequent signs of tuberculosis. But, as a matter of fact, we find the very reverse. An examination of the autopsy records of large hospitals in many countries shows that primary intestinal tuberculosis in the very young is curiously rare; therefore, says Koch, bovine tubercle bacilli have so little virulence for man that the drinking of the milk of tuberculous animals is to be regarded as a negligible factor in the causation of human tuberculosis.

But now, to choose one much-discussed conclusion in direct opposition to this, we find the statements and deductions of the late Thorne Thorne, a careful student of infectious diseases, one holding deservedly a very high official standing in Great Britain. These may be epitomized as follows (I purposely exclude figures and details so as not to detract from the broad outlines of the case): Thanks to the promulgation of the laws of hygiene and to the improved construction and ventilation of the home and the workshop, there has been a very remarkable decrease in the mortality from tuberculosis in Great Britain during the latter half of the nineteenth century.

There is, however, an exception to this statement. The deaths below the age of five registered as due to tabes mesenterica—that is to say, as due to abdominal tuberculosis—instead of diminishing, have definitely increased.

The improved sanitary conditions must have told upon all ages alike; therefore some other factor must be invoked to explain the increased infantile mortality from abdominal tabes, some factor telling upon the young child and not upon the adult.

There is one prominent difference between the young child and other members of the community, and that is the character of its nutrition. Increased mortality from tuberculosis does not show itself until the period when the infant begins to be fed upon cow's milk. After the age of five, when the child ceases to partake of a milk diet, the incidence of tuberculosis diminishes. There has been a steady, not to say rapid, increase in the spread of bovine tuberculosis coincident with the increase of tabes mesenterica.

Therefore, the increase in abdominal tuberculosis in children

noted in the mortality statistics of Great Britain can only be ascribed to infection through the digestive tract, and therefore in this remarkable state of affairs, we have the strongest possible evidence that bovine tuberculosis is transmissible to man.

Dr. Salmon has brought forward a similar argument from the vital statistics of Massachusetts.

This argument, it will be seen, is, at first sight, as convincing as the former; that was based upon the absence of tuberculosis in children; this upon its presence. It is as true that primary intestinal tuberculosis in young children is distinctly rare, as observed at autopsy, as it is that there has been a definite increase in the deaths in Great Britain registered as due to tabes mesenterica. All the same, Koch's conclusion constitutes at most a half-truth, Thorne Thorne's possibly does not attain unto that status.

We now know—and curiously Koch himself had been one of the first to publish the fact—that if we give tubercle bacilli to animals by the digestive tract, the primary recognizable lesions do not by any means of necessity first manifest themselves in the walls of the intestines or even in the associated mesenteric glands. On the contrary, in the majority of cases, they are apt to show themselves in the peribronchial, peritracheal and cervical lymph glands. Therefore, absence of abdominal tuberculosis is by no means an indication of absence of infection through the digestive tract. Nor again was Koch justified in considering only those cases in which there were intestinal lesions; if with them, as would seem only right, cases of primary mesenteric tuberculosis be united, then primary abdominal tuberculosis in children is not so rare as has been laid down. Koch's eventual conclusion may, or may not be correct, but it is based upon absolutely insecure premises.

As regards the other case, we know now that the use of the term tabes mesenterica in English death reports means practically nothing in the majority of cases. It has been the custom to use this as a convenient term for deaths in young children preceded by progressive wasting. Where careful autopsies have been made in connection with English children's hospitals, the number of cases determined of primary abdominal tuberculosis have not proved themselves materially more abundant than in Germany or this country. They bear no relationship to the numbers given in the mortality statistics.

There are, it is true, certain curious exceptions to this statement —exceptions so at variance with other European and American experiences that they must, I think, be justly regarded as doubtful

until further information is obtained. Thorne Thorne's argument is thus, I hold, valueless as absolute evidence of infection from bovine sources, and Dr. Salmon's figures from the vital statistics of Massachusetts, I take it, labor under the same weakness. He found that there is an increase of 30 per cent. in forms of tuberculosis other than phthisis in children under five years of age. while there is a coincident decrease in the mortality from phthisis at all other ages of about 45 per cent. (I quote from Rober, not having seen the original). Here against it has to be objected that the figures are not based upon absolute diagnosis. Remembering that the danger of infection through milk has loomed large in the medical world of late years, a tendency to ascribe meningitis and wasting diseases in children to this cause is inevitable. Has Dr. Salmon been able to demonstrate any diminution in the number of cases coincident with the period of active eradication of the disease among cattle by the Cattle Commissioners of that State, or to announce a corresponding increase of frequency of that disease as established by the tuberculosis statistics of the large hospitals of the State? If he has not, then, though they appear so very striking, I cannot but feel that the figures are of little value. Here, again, do not misunderstand me, I do not deny that there may have been increase in the mortality from tuberculosis among young children, that may well be the case. I only urge that, as a matter of evidence, vital statistics are too unsure to be applied as a proof positive. Dr. Salmon's figures are most striking, but at most they afford useful indications for applying a surer test.

But it may be urged that there still remain the remarkable facts, first, that abdominal tuberculosis is much more common in children than in adults, and secondly, that at the conclusion of the milk-drinking age, the mortality from tuberculosis in general shows a remarkable and sudden drop. Both these facts have to be admitted, and yet, in careful study, they will be seen, I think, to afford only an apparently, and not absolutely, conclusive agreement. To render the argument incontrovertible it must be shown not that tuberculosis is absolutely more frequent during the milk-drinking age, but that, taking the whole infantile mortality, tuberculosis still maintains a proportionate increase. If you study that very striking chart which all of you passed as you entered this room—I mean that devised by Dr. Fulton, and showing the incidence of tuberculosis to other forms of disease as a cause of death at successive life periods—even although it is constructed from

mortality statistics and so exaggerates the number of cases of infantile tuberculosis—you will observe that while very many more children die from tuberculosis before the sixth year than from the ages of five to ten—nevertheless, *proportionately*, a greater number die from this disease during the latter period than from other diseases. In other words, the milk-drinking age corresponds with a period of extreme susceptibility on the part of the human organism to very various infections, and secondly, with a peculiar tendency for tuberculosis mainly to affect the lymph glandular system. And both these tendencies have to be weighed very carefully before we can reach a positive result. But I shall revert to matters bearing upon these two objections in a few moments, and then their value will, I trust, be better realized.

As a useful introduction to further study of the value of the evidence afforded regarding the transmission of the disease from cattle to man, and of the subtlety of half-truths, it will be well to consider next the recent and in many respects important contributions to the subject by one who has made other most valuable contributions thereto. I refer to the recent address of Professor von Behring to the Association of German Naturalists at Cassel.

Behring is strongly of opinion that the principal source of tuberculosis is the milk with which infants are fed. His argument is the following:

If milk containing virulent anthrax bacilli be given to young guinea pigs less than eight days old, there is obtained a generalized infection in all respects similar to that obtained by subcutaneous injection. In short, the first line of defense—the mucous membrane of the digestive tract—is so feeble in the new-born that bacteria pass with ease into the deeper tissues. Giving attenuated anthrax bacilli to the newly-born guinea pig, Behring found them present in the tissues for a long period without causing the death of the animals. So also with tubercle bacilli given by the mouth to these young guinea pigs. They set up tuberculosis which appears first, not in the mesenteric, but in the cervical lymph glands. The same bacilli fed to adult guinea pigs are without effect. Recalling how frequently in man the cervical and allied peribronchial glands show signs of primary infection, Behring concludes that in man, as in animals, pulmonary tuberculosis is of intestinal origin, and that it may be contracted at a very early age. But this implies that bovine tuberculosis is the main cause of human tuberculosis.

Here we have some most important facts contributed to the dis-

cussion, and a most important deduction. All the same, I think it must be recognized that the facts, while true, are in this respect but half-truths, and that the deduction is therefore unsound.

That bacteria pass through the intestinal mucosa, and do this at all periods of life, is a matter which, it seems to me, must be recognized, the proofs are so strong. I do not see, for example, how the results obtained by Dr. W. W. Ford, my old pupil, now of the Johns Hopkins pathological department, upon the presence of bacteria in healthy organs can be controverted. That they pass with peculiar ease during the earliest period of extrauterine existence must also be admitted. Twenty years ago Weigert pointed out that this must be accepted regarding the tuberculosis virus in infants. If this be true, how is it that the innumerable bacteria of the intestines do not, by their passage into the system, kill off every child born into the world, for these intestinal bacteria have undoubted pathogenic properties? As a matter of fact, such bacteria are constantly being killed within the tissues by the leucocytes and by the endothelium of the vessels, more particularly by that lining the liver capillaries. The remarkable development of the lymph glandular system in the child is not a little suggestive as indicating a protective mechanism.

It must, therefore, be freely admitted that microbes taken in with the food are likely to pass into the lymphatic and vascular systems, and that in individuals fed with milk containing bovine tubercle bacilli in large numbers some, it may be a large number, of these find their way into the organism. But, admitting this, are we to accept Behring's conclusions? I think not. It will be seen that Behring argues that, granted this admission, we have an adequate explanation for most tuberculous infections. He points out that bacteria entering by the digestive tract do not necessarily set up tuberculosis in the nearest set of lymphatic glands, but, passing through these, only multiply in a region of less resistance, which in general is, in the guinea pig, the cervical lymph glands, in man the peribronchial. This also must be admitted. The observations of Delepine that when bacilli are inoculated into the leg of the guinea pig tubercles are found in the spleen before even the superficial glands of the thigh become affected abundantly demonstrate this fact. It would therefore seem useless, or almost useless, to attempt to draw any conclusion in regard to the mode of infection from statistics regarding the relative frequency of intestinal and other forms of tuberculosis in children and adults, respectively. The careful statistical observations of

numerous observers have shown that in children, as in adults, the most frequent indications of primary infection are to be found in the thoracic cavity. The most that can be said is that if in children indications of primary mesenteric tuberculosis are relatively more frequent than they are in adults, this affords clear presumptive evidence that infection has been through the intestines.

It must, however, be recognized that this is a matter for argument—that is, it may be urged on the contrary, that the evidence shows that the bacilli multiply and set up lesions not at the point of entrance, or in the lymph glands first reached by them, but in glands having the lowest resisting power; that the fact that in some cases these glands are the mesenteric, in others the cervical, in yet others the peribronchial, renders it possible, if not indeed probable, that the mesenteric glands may be most involved in a certain proportion of cases in which infection has been through the respiratory tract; that mesenteric involvement is not proof positive of alimentary infection; and in support of this thesis it may be urged that in the cases carefully examined so far, bacilli of the human type have been found more frequently than those of bovine type.

Understand me: I am not here expressing a belief. I am but putting a case—a line of argument which it seems to me difficult to disprove. Instinctively my personal impression is that this is a mistaken argument. What I want to show is that, given a limited number of facts, our deductions cannot be positive; we cannot be sure that we have a true knowledge of affairs. Behring's hypothesis is thus weakened by his failure to prove surely that peribronchial tuberculosis in man is due to infection through the digestive tract. The very fact that tuberculosis does not necessarily show itself in the first set of lymphatic glands to which the bacilli gain entrance, and that the development of the tubercles would seem to depend rather upon relative lack of resistance in the different tissues composing the system, makes it impossible to make positive statements regarding modes of infection.

Behring has completely overlooked one fact, namely, that this lack of resisting power to the passage of bacilli in young animals is not confined to the mucosa of the intestines. It is common to all mucous membranes—to that of the mouth, throat, trachea, and bronchi. All these in the adult permit the passage of a certain number of bacteria, just as does the intestinal mucous membrane, and infection may occur through them as through the intestines. Therefore, valuable as are his observations as indicating the way

in which infection may occur in the individual, they carry us not one whit further towards solving the question as to whether the tuberculosis of the young and of the adult is mainly of bovine or mainly of human origin. They do not prove that such infection has surely taken place by means of the digestive tract. If, as I gather from his paper, he is of opinion that infection is in man through the intestines, and is contracted at a very early age, lying latent for years, he would have had to show that evidences of tuberculosis are to be made out in the glands at or immediately following the milk-drinking period almost as frequently as at later periods. Now, Nageli's figures, which he quotes, amply indicate that this is not the case. Nageli found that whereas evidences of the disease were to be found in the bodies of everyone in Zurich who died after the age of thirty years, in children from one to five years, only 17 per cent. showed recognizable evidence of its presence; under one year no signs could be seen. Failing this, he should explain how and why bacilli lie latent, causing no recognizable reaction, not merely for days, but for years. In this he would experience considerable difficulty, when, as a matter of fact, tuberculosis other than abdominal is in young children characterized by its tendency to rapid spread. Whereas in adults we find great liability to infection, productive change, and clear indications of a well-marked reaction on the part of the tissues, this is characteristically absent in children; or, otherwise, once the bacilli gain a hold upon the young child, the resisting powers are but slight. The doctrine of latency of the bacilli in young children has no more sure foundation than Baumgarten's well-known theory of latency in connection with congenital tuberculosis. It a theory having no adequate foundation of facts to support it.

Over and above all Behring is so impressed by his discovery of the easy passage of bacteria through the intestinal wall in the young animal that he wholly neglects the evidence already accumulated of a similar extensive—though not so extensive—entry at all other periods of life, and so he fails to comprehend that tubercle bacilli must gain entry, and *may* set up infection, at all ages, and may enter not merely through the digestive tract but also through the respiratory passages; considerations which under the development of a theory of latency quite unnecessary, and at the same time materially weaken the argument that habitually infection originates in the young child and then through the digestive tract. Here, as bearing on this point, I may recall Ravenel's observations upon feeding young dogs (I believe I am correct) with butter

containing tubercle bacilli and finding the bacilli a few hours later in the contents of the thoracic duct.

How we are to regard infection in general in face of this frequent entry of various microbes into the tissues is quite too large a subject to enter into this evening. I would only state that the mere entry is a secondary matter; what is of import is the virulence of the entering microbes and the extent of resisting power of the tissues.

And this brings up coincidentally another argument, not, it is true, raised by Behring, but in part it may be implied, namely, that there is a greater liability to infection by bovine tuberculosis than by human. The argument may be expressed thus:

Human tubercle bacilli, as Behring himself has more particularly shown by his immunization experiments, have relatively little virulence, as a rule, for cattle. Again, human tubercle bacilli are less virulent for guinea pigs: bovine tubercle bacilli are remarkably virulent for these animals. Therefore, bovine bacilli must be accepted to be more virulent also for man, and infection through bovine sources is the more liable to occur if bovine bacilli gain entrance into the human system. This argument again may be correct. Again, it has to be admitted that it is insecure. Our experience with regard to the passage of bacteria through a series of animals shows that, in some cases, the virulence of these bacteria is heightened for animals of another species, but for animals of yet other species it is lessened. We cannot argue from analogy. The only way to determine this point is by observations regarding the effects of bovine tubercle bacilli upon the human being. Now we possess such observations, and as far as they bear upon relative virulence they are, to say the least, conflicting. That bovine bacilli are capable of setting up tuberculosis in man is now, I think, surely proved. And here let me state that with the accumulation of fresh evidence my personal views regarding this have undergone some little modifications. Believing three years ago that the communication was distinctly rare, I now cannot but conclude that it occurs not nearly so rarely. I still, however, cannot go so far as Behring would indicate. Rather I hold with the opinion of the late Professor Nocard, uttered at the London Congress, that it is a secondary factor in the progress of human tuberculosis. But this is in itself but a secondary matter and parenthetical. Some, at least, of the cases collected by Dr. Kober, of Washington, must, I think, convince all reasonable individuals. While many of the eighty-five cases he has collected of milk infection do not fulfill

all the conditions required to make that positive as compared with presumptive evidence, sufficient evidence is left to establish the case. More particularly the instances of transmission through the infection of wounds, notably those reported by Ravenel, are beyond cavil. It is not a little remarkable that Behring would leave these out of account, giving as his opinion that where general infection follows such wounds infection develops, not from the wound, but from the setting up of a tuberculosis of intestinal origin already present but latent—a curious example of how far a working hypothesis will carry an earnest worker once it gains the mastery. The majority, I feel assured, will be content to accept such general infection as directly induced by the profuse local growth of bacilli in the region of the wound. But, accepting these cases—or a considerable number of them—what evidence do they afford that the bacilli are of increased virulence? Taken altogether, they prove the very reverse. I mean this: once it is granted that the bovine bacilli can cause the disease in man, then if they possess high virulence for human beings, the irrefutable cases should be more numerous than they are, and the individual cases already collected should more constantly indicate the peculiarly rapid or malignant advance of the disease. Certain cases, it is true, show this, but by no means all. One matter is very striking. Not a single report, as yet, to my knowledge has been published in which the little children supplied from one milk round have coincidently been found to suffer with tuberculosis. Now the milk from a cow with a tuberculous udder may contain literally millions of bacilli, so many that even after dilution with the milk of ten or twenty healthy cows, each cupful must contain an abundance. I may here, for example, recall a well-known observation of Kanthack and Haden that 50 per cent. of the milk supplied to the various Cambridge colleges was infectious for guinea pigs. It is, therefore, not a little remarkable that if bovine bacilli be highly virulent, then, in countries where bovine tuberculosis is much more common than it is in this, taken into the intestines as they are day after day by young children, we have no evidence that they set up local epidemics of the acute disease. Unfortunately those cases are not placed upon record, or at most are but incidentally referred to, in which children fed upon the milk of highly-tuberculosis herds, have remained in perfect health and show no signs of the disease. Yet these cases exist and a little inquiry brings them to light. The only conclusion that I can reach provisionally is that, in general, bovine tubercle bacilli are not more virulent for man than are those of human provenance, if indeed they be so virulent.

But this method of approach is most unsatisfactory. It can but yield us partial results, but part of the truth. Once we accept that infection may occur through milk and seek to find evidence of this, then if, as I say, the bacilli are not more virulent than are those of human origin, we must be prepared to accept that many cases of bovine origin run a prolonged course. And we must inevitably fail to trace a large proportion of the cases simply because so long a time has elapsed that the specific occasion of infection passes out of the memory of those immediately concerned. And if, again, we accept, as we must, that the focus of primary infection may show itself at a distance from the point of entrance of the virus, it becomes hopeless to arrive at anything approaching to a correct knowledge of the proportion of cases due to bovine infection.

To arrive somewhat near the truth concerning the frequency of transmission of tuberculosis from cattle to man, only one correct method presents itself to me. That method has been made possible by and owes itself essentially to American research, and, above all, to the painstaking and accurate studies of Dr. Theobald Smith. Parodoxically it is based upon those facts which at first were by many regarded as proving the non-identity of human and bovine tuberculosis. To Dr. Theobald Smith we owe the most careful investigations into the features which differentiate the bovine strain of tubercle bacilli from the human, those features superadded by prolonged growth in the body of individuals of one or other species; and lately he has added to this earlier work by showing how to differentiate the two by determination of the reaction in the glycerine broth upon which they are grown. If this at first be made freely acid, the bovine strain of the bacilli eventually causes the medium to become alkaline; the human strain after producing a temporary alkalinity of the medium causes it to revert to an even greater acidity than at first. It will be remembered that Roux and Nocard showed that it required months to convert the human into the avian type, and after months it may well be that the bovine bacilli that have entered the human body take on the human characteristics. Hence, I doubt whether the test to be proposed can be applied to cases of chronic diseases or even to acute cases developing in adults. In the latter it may be well that the bovine bacillus only becomes acutely infective after a slow and prolonged local growth, after it has become accustomed to the new soil and has become modified. But acute cases occurring in young children, whose tissues are less resistant, ought to

afford the required proof, for the active development of the bacilli should occur before the original features become lost. If, in each of our large centres, some one or more workers were to make cultures of the bacilli from a long series of such acute cases, and were to apply Smith's test, the relative frequency of infection from human and bovine sources would be determined. Nor can I think of any better means from a medical standpoint for utilizing such noble gifts as the Carnegie Fund, for example, or those placed at the disposal of the Phipps Institute, than in the direction here indicated. The work is laborious; time—some two or three years—would be necessary to collect a sufficiency of instances, and great patience. But if some promising and well-trained investigator were to take up the work in each of our great cities under the central direction of one leader in the profession or of a small committee the necessary facts would be collected in necessary numbers; what is more, the results obtained by several independent observers would eliminate the personal equation, a matter of angry debate would be settled, we should possess positive rather than presumptive evidence, and we should be nearer to the truth.

What that truth is I cannot announce to you, for we have not yet attained to it. I can only say that the method here indicated is promising and possible, and that already those not using material which comes up to the requirements here laid down have discovered bovine bacilli in cases of human infection. Vagades has obtained cultures of bacilli of the bovine type in one out of twenty-eight cases isolated from man, Lartigan in at least one out of nineteen, the German Commission in four out of sixteen cases examined, DeSchweinitz in two out of four; and when we come nearer to the requirements here indicated, Theobald Smith has found them in one out of two cases of primary mesenteric tuberculosis of children, and Ravenel in two out of five.

But why, it may be asked, trouble so much about arriving at the exact truth? You admit that bovine tuberculosis is transmissible to man? That is sufficient, and once this is recognized, the duty of the Government and of the people is obvious. What is more, all advances so far have been made by recognition of half-truths in biology. To quote illustrations, that I have already offered in another connection, the most potent argument in favor of regarding the anthrax bacilli as the active agent in infection, brought forward by Davaine, who shares with Pollender the honor of having discovered the first bacterial cause of disease, was that if a pregnant sheep or cow died of the disease, the maternal blood

which contained abundant bacilli was capable of causing the disease in other animals, whereas the blood of the fœtus which he found free from germs was absolutely harmless even when inoculated in large quantities. We now know that the fœtal blood in infectious diseases is not necessarily free from the germs of the disease. The fœtus may suffer with the same infection as did the parent. But in the days when methods of isolation of bacteria were imperfect, no surer demonstration could well have been adduced of the pathogenic power of the bacilli. Here, then, we have a distinct advance based upon a half-truth. Later, in connection with this same disease, Pasteur, who demonstrated that the bacilli are the direct cause of the disease, pointed out that if a broth culture be made of the bacilli and then these be filtered off and the clear filtrate alone be inoculated into animals, no results ensue, whereas a minute amount of the bacilli left behind on the filter, when inoculated into susceptible animals, surely leads to fatal disease. Here, again, we have an advance based upon—half-truth. It so happens that the filtrate from anthrax cultures contains a relatively small amount of the toxins, and under slightly different conditions of the experiment, injecting larger quantities of the filtrate, Pasteur might have killed his animals, and had he been working with other germs, for example, those of diphtheria, his demonstration would have failed. The promises were apparently most conclusive; all the same they were not by any means perfect.

So, again, to give another example in connection with typhoid. For some little time after the discovery of this germ, it was not recognized how difficult it is to distinguish it from the bacillus coli, the commonest of the inhabitants of the normal intestine. When, therefore, it was pointed out by numerous observers that typhoid bacilli were present in the stools, in enormous quantities, the conclusion was reached that it was absolutely essential to disinfect the excreta in order to prevent the spread of infection, a conclusion which it happens we now know was quite correct, only it was based upon erroneous observations. Now, after long years of patient endeavor, we are able surely to separate the colonies of typhoid and colon bacilli present in the stools, and we can surely demonstrate that they are present there, and present also in considerable numbers at a certain stage of the disease. Here, again, therefore, mistaken observation led to advance.

No one will grant more freely than I do that if the legislation regarding bovine tuberculosis was based upon an imperfect con-

ception regarding the relative frequency of the conveyance of the disease from cattle to man, that legislation has constituted a very distinct advance. From a purely commercial aspect, whatever be the result of this active controversy, it is the duty of the Government, as it is to the pecuniary advantage of the farmer, that tuberculosis be, if possible, eradicated from or kept within low limits among our herds, and the present legislation might go much further than it does towards accomplishing this end. But if half-truths are useful, and if we have to be in the main content with them, it is the duty of the man of science to seek ever after a nearer realization of the whole truth. He must not expect to attain unto it. The whole in anything mundane seems almost beyond our grasp. Even the mathematician, with methods approaching to perfection, is not master of the mysteries of that remarkable conception, the circle. Let him strive all his days, and he will never determine the exact value of the ratio. Even now the atoms are being knocked from under the feet of the physicist. But if he cannot attain thereunto, it is for the man of science to strive ever to approach nearer to it, to be dissatisfied with half-truths. He must either accept them as adequate and get into the habit of regarding them as fixed. His new facts lead to the demonstration of the imperfection of those half-truths. He must ever be prepared to modify his views. Facts are not truths. True in themselves, they may, if insufficient, and if they do not bear upon all the factors concerned, actually lead away from the truth, and in medical as in physiological problems so many factors are involved, the half-truth is always to be guarded against.

So, gentlemen, if the views enumerated this evening are not those of the majority, if my criticisms have seemed needlessly destructive, if, indeed, those things which I have taken to be facts be not facts, I shall, notwithstanding, feel that I have not spoken in vain if I have impressed upon you the imperfect nature of the evidence upon which some of our favorite conclusions regarding tuberculosis are based, the need for further research, and the supreme need for more accurate methods of work and of thought.

[Reprinted from Maryland Medical Journal, March, 1904.]

PULMONARY CONSUMPTION AND THE POSSIBILITY OF ITS ERADICATION THROUGH THE COMBINED EFFORTS OF A WISE GOVERNMENT, WELL-TRAINED PHYSICIANS AND AN INTELLIGENT PEOPLE.

By S. A. Knopf, M.D.,

New York City.

Vice-President of the American Academy of Medicine; Corresponding Member of the International Central Bureau for the Prevention of Consumption; Member of the New York Tuberculosis Committee of the Charity Organization Society; Associate Director of the Clinic for Pulmonary Diseases and Attending Physician to the Riverside Sanatorium for Consumptives of the Health Department of the City of New York; Consulting Physician to Sanatorium Gabriels, Gabriels, N. Y., etc.

ADDRESS DELIVERED AT M'COY HALL OF THE JOHNS HOPKINS UNIVERSITY, UNDER THE AUSPICES OF THE BALTIMORE (MD.) TUBERCULOSIS EXPOSITION, JANUARY 28, 1904.

Mr. Chairman, Ladies and Gentlemen:

The Tuberculosis Exposition, which is the occasion of our gathering here in Baltimore, marks an epoch in the history of the anti-tuberculosis crusade in America. The State of Maryland, the city of Baltimore, and all the other promoters of this truly great and humanitarian enterprise are to be congratulated on their success. To be permitted to address on this occasion an audience composed of physicians, hygienists, sanitarians and laymen, who by their very presence here show their deep interest in this great medical and social problem—the eradication of tuberculosis—is a privilege which, I assure you, I appreciate highly.

When my distinguished friend, Professor Osler, extended to me this flattering invitation, he told me to make my talk semi-popular

or popular. This would be, of course, very well for so great a scholar and practical teacher as Dr. Osler, but to the average physician this is not so easy a thing. In fact, not everyone has the gift to speak the language of science in the language of the people, and thus if I fall short in my task I ask your indulgence.

As my title indicates, I am to speak on consumption, or pulmonary tuberculosis, and the possibility of its eradication. By eradication I mean, of course, how to prevent and how to cure the disease, with the ultimate object of causing it to practically disappear. In order that I may suggest to you my thoughts on how to proceed to attain this goal, it will be necessary to give you first a general idea of the character and the peculiarities of the disease.

Pulmonary tuberculosis, or consumption, is a chronic, infectious and communicable disease, caused by the presence of the tubercle bacillus, or germ of consumption, in the lungs. The disease is locally characterized by countless tubercles, that is to say, small rounded bodies, visible to the naked eye. The bacilli can be found by the million in the affected organ. It is this little parasite, fungus, or mushroom, belonging to the lowest scale of vegetable life, which must be considered as the specific cause of all tuberculous disease. This parasite, not only gradually destroys the lung substance through ulcerative processes, but at the same time gives off certain poisonous substances, called toxins, which give rise to various, and often serious, symptoms.

The important symptoms of pulmonary tuberculosis are cough, expectoration, fever, difficulty in breathing, pains in the chest, night-sweats, loss of appetite, hemorrhages and emaciation. In the matter expectorated it is often possible to find the tubercle bacillus with the aid of the microscope and certain coloring matters. It appears in the form of small, slender rods.

How may this germ of consumption enter the human system?

There are really three methods whereby this germ may enter—namely, by inhalation, that is, being breathed into the lungs; by ingestion, that is, being eaten with tuberculous food; and by inoculation, that is, the penetration of tuberculous substances through a wound in the skin.

Let us treat first the most frequent method of the propagation of tuberculosis—namely, that arising from the indiscriminate deposit of the tuberculous sputum. A consumptive individual, even at a period when he is not confined to his bed, may expectorate enormous quantities of bacilli. Now, if this expectoration, or spittle, is carelessly deposited here and there so that it has an

opportunity to dry and become pulverized, the least draft or motion in the air may cause it to mingle with the dust, and the individual inhaling this dust-laden atmosphere is certainly exposed to the danger of becoming tuberculous if his system offers a favorable soil for the growth of the bacilli. By "favorable soil for the growth of the bacilli" must be understood any condition in which the body is temporarily or permanently enfeebled. Such a condition may be inherited from parents or acquired through alcoholism or drunkenness or other intemperate habits, through privation, or disease.

Besides the danger arising from carelessly-deposited sputum, or spittle, the inhalation or ingestion of small particles of saliva which may be expelled by the consumptive during his so-called dry cough, when speaking quickly or loudly, or when sneezing, must also be considered as dangerous for those who come in close contact with the invalid. These almost invisible drops of saliva may contain tubercle bacilli. Recent experiments in this direction have shown the possibility of infection by this means.

The next most frequent method of the propagation of tuberculosis is through the ingestion of the bacilli—that is to say, when the germ of consumption is taken with the food.

The third, and much less frequent, way of the cause of tuberculosis is the inoculation or penetration of the tuberculous substance through the skin.

What should we do to stop the first and most frequent source of the dissemination of the bacillus?

A patient suffering from pulmonary consumption should know that, no matter in what stage of the disease he may be, his expectoration, or spittle, may spread the germ of the disease if the matter expectorated is not destroyed before it has a chance to dry and become pulverized. The patient should, therefore, always spit into some receptacle intended for that purpose. It is best to have this vessel made of metal, so as not to break. It should be half filled with water or some disinfecting fluid, the main thing being to make it impossible for the expectoration to dry.

In factories, stores, railroad cars, waiting rooms, court rooms, restaurants, saloons, meeting places, theatres, menageries—in short, wherever many people congregate—there should be a sufficient number of cuspidors, well kept and regularly cleaned. They should be made of unbreakable material and have wide openings. If such measures are carried out, there will be no excuse for anyone to expectorate on the floor and thus endanger the lives of his fellow-men.

When outdoors the patient should use a pocket flask of metal, strong glass or pasteboard. There are numerous kinds of flasks in the market and I show you here a few of them.

A handkerchief should never be used as a receptacle for sputum. Patients who are too sick to make use of light porcelain or aluminum cups should have a number of moist rags within easy reach. Care should be taken that the rags always remain moist and that the used ones are burned before they have time to dry. The paper spit-cups, with their contents, should, of course, also be destroyed by fire.

There will always be some consumptives who cannot be persuaded to use the pocket flask, for the simple reason that they do not wish to draw attention to their malady. The only thing for these people to do is to use squares of soft muslin, cheesecloth, cheap handkerchiefs or Japanese paper handkerchiefs specially manufactured for that purpose, which can be burned after use. They should also place in their pockets a removable lining of rubber or other impermeable substance which can be thoroughly cleaned. This additional pocket could be fastened to the inside of the ordinary pocket by clamps, and would thus be of no inconvenience to the patient. A pouch of vulcanized rubber or an ordinary tobacco pouch may be used in place of the extra pocket of impermeable material.

The danger of dissemination of the bacilli through the so-called dry cough is relatively small. We should, however, nevertheless insist that the patient hold a handkerchief before his mouth or nose when he coughs or sneezes. The consumptive should be advised to carry two handkerchiefs with him—one to hold before his mouth and to wipe it with after having expectorated; the other to use only to wipe his nose. By being careful with the use of his handkerchiefs the danger of infecting his nose and bronchial tubes will be materially lessened.

All dirty linens (sheets, pillow-cases, underwear, napkins, handkerchiefs, etc.) used by the consumptive should not be handled more than necessary, but should be placed in water as soon as possible after removal from bed or body. It is better to wash these articles separately, and only after having been thoroughly boiled should they be put with the common laundry. Whenever it is not possible to carry out these precautionary measures in their entirety, one should strive to follow them as far as it is in one's power.

Against the danger from infection through tuberculous food we

will say that whenever one is not reasonably certain that the meat he eats has been carefully inspected and declared free from disease germs, it should be very thoroughly cooked. By this means one is certain to kill all the dangerous micro-organisms. Against the sale of tuberculous milk there are very excellent laws in some States of the Union, which are rigorously enforced. In some the laws are less good, and in some there are no laws at the present time.

In justice to farmers and dairymen it must, however, be said that there are many who do their very best to protect themselves and their fellow-men from the danger of tuberculosis. They have their cows tested regularly, destroy the animals which are found to be tuberculous, and keep their stables and utensils for milk as clean as possible.

Unless one can be reasonably sure that the cows from which the milk is derived are healthy, and not tuberculous, the milk should be boiled or sterilized before use, especially when it is intended as food for children. Milk obtained from stores and from milk peddlers should invariably be submitted to boiling or sterilization. When milk is kept slowly boiling for five minutes all the bacilli are killed, and the same result is obtained by the sterilizing process —that is to say, to keep the milk heated for at least half an hour at a temperature of about 70° C. or 160° F. There are now in the market a number of cheap and practical apparatuses for sterilizing milk which can be obtained at almost any drug store.

Raw fruit bought from the pushcart man, or, for that matter, derived from any other source, should be washed, peeled or cooked before being eaten.

There is another possibility whereby the germs of consumption may enter our stomach or intestines—namely, through kissing the consumptive or using utensils which have been soiled by the saliva of the patient. Therefore, the consumptive should never kiss, no matter whom, on the mouth, and children should be taught not to allow anyone to kiss them, except on the cheek, or not at all.

Tuberculous patients should have their own drinking glasses, spoons, forks, etc., or, at least, all table utensils which have served the tuberculous patient should be sterilized in boiling water after use.

It is, of course, also possible that the consumptive may contract intestinal tuberculosis when he, out of false modesty, swallows his expectoration. He should also remember never to touch food before having washed his hands very thoroughly. Even with the

greatest care it is possible that he may have soiled his hands with tuberculous expectoration.

Inoculation, or the penetration of tuberculous substance through the skin, happens perhaps most frequently through injuries received while cleaning nickel or chipped glass or porcelain cuspidors which had been used by consumptives. It is also possible for the bacilli to enter the circulation if the person cleaning the spittoons happens to have a wound or open sore on his hands. Persons entrusted with the care of the spittoons in a private home or in an institution for consumptives should wear rubber gloves while cleaning these vessels.

At times the patient may inoculate himself by placing an accidentally-injured finger in his mouth or by carelessly soiling an open wound with his expectoration.

Physicians, students of medicine or veterinary science, butchers, etc., are also exposed to the danger of wounding themselves with instruments which may have come in contact with tuberculous matter. Extreme care is the only remedy for all persons thus exposed.

If one has been unfortunate enough to receive an injury, and tuberculous inoculation is feared, the best thing to do is to let the would bleed freely, wash it thoroughly with water that has been boiled with a 5 per cent. solution of carbolic acid, or with pure alcohol; dress the wound with a clean rag dipped in any of these liquids, and seek as soon as possible the advice of the physician.

I have thus far only spoken of tuberculosis which manifests itself in the pulmonary form—that is to say, consumption of the lungs; of intestinal tuberculosis—that is to say, consumption of the bowls, and tuberculosis of the skin, or lupus. But you must know that every organ in the body, such as the throat, the bones, and the covering of the brain and spinal column, are also not infrequently invaded by the tubercle bacillus. In the latter form the disease is technically called tuberculous meningitis.

After all that you have heard so far of the contagiousness, or, rather, the communicability of tuberculosis, and consumption in particular, I do not wish you to think that a breath in an atmosphere accidentally laden with bacilli would certainly render a healthy individual consumptive, or that by a swallow of tuberculous milk or a little injury from a broken cuspidor one must necessarily become tuberculous. The secretions of our nasal cavities, doubtless also the blood, and the secretions of the stomach of the healthy individual have bactericidal properties—that is to

say, they kill the dangerous germs before they have a chance to do harm. Therefore the healthy man and woman should not have an exaggerated fear of tuberculosis, but they should, nevertheless, not recklessly expose themselves to the danger of infection.

But who are the individuals who must be particularly careful so as not to be attacked by the almost ever-present tubercle bacillus?

There are four classes—first, those who have a hereditary predisposition to consumption; secondly, those who have weakened their system and thus predisposed themselves to consumption by the intemperate use of alcoholic beverages, by a dissipated life, by excesses of all kinds, etc.; thirdly, those whose constitution has been weakened through disease—for example, pneumonia, typhoid fever, smallpox, measles, whooping-cough, syphilis, influenza, etc.; fourthly, those whose occupations, trades or professions, such as printing, hat making, tailoring, weaving, and all occupations where the worker is much exposed to the inhalation of various kinds of dust, have rendered them particularly liable to consumption.

Before I proceed to give you a few of the essential points how to overcome such a predisposition to consumption, let me answer the question which I believe to read in the minds of many who honor me by their presence here—namely, what about those who have a hereditary consumption? Permit me to say that the popular notion concerning hereditary consumption is, in my humble opinion, absolutely erroneous. Consumption has, perhaps, never been inherited either from the father or the mother, but the child has usually been infected by its well-meaning but ignorant consumptive parents after birth.

The most common modes of infection during early childhood are perhaps the following: The consumptive mother caresses the child and kisses it on the mouth; she prepares the food, tasting it to judge its temperature and flavor through the same rubber nipple or with the same spoon the child uses, and thus unconsciously conveys the germs of the disease from her own mouth to that of the child. Later on the child will play on the floor in the room, and should there be a consumptive in the family who, from carelessness or ignorance, is not prudent in the disposal of his expectoration, the child is indeed likely to be infected. The little one while playing on the floor may with great facility inhale the bacilli floating with the dust in the air, and can thus acquire tuberculosis by inhalation, the full development of which may only take place in

later years when the origin will not be thought of. Again, the little child touches everything it can take hold of, infecting its fingers thoroughly, and by putting them in its mouth may cause tuberculosis by ingestion, which will gradually develop into consumption of the bowels. Lastly, should the child's nails be neglected, it may scratch itself with the infected fingers and thus inoculate its system with the disease. Tuberculosis of the skin, or lupus, may result from such an unfortunate accident.

Even later on, when the child goes to school, the danger of contracting tuberculosis is not removed. The child may become attached to a little consumptive companion, and they will kiss each other when going or coming from school; or, again, the infection may result from the not unusual practice of swapping apple cores, candy, chewing-gum, etc.

To prevent these modes of infection during childhood is certainly possible by taking the following precautions: Not only should consumptives be religiously careful with their expectoration, but they should associate as little as possible with young children, and stay away from playrooms and playgrounds. We repeat that to kiss children on the mouth should never be allowed, and the little ones should be taught never to kiss and be kissed by strangers. They should be kissed by their own friends and relatives as little as possible, and then only on the cheeks. The floor on which the child plays should be kept scrupulously clean. Fixed carpets in such a place are an abomination; they only serve as dust and dirt collectors, and not infrequently harbor the germs of contagious diseases. The hands and nails of little children should be kept as clean as possible. Expectorating on playgrounds should be considered a grave offense and should be punished accordingly. These playgrounds should be kept clean and as free from dust as possible, being daily strewn with clean sand or gravel.

To protect the child from contracting tuberculosis during school life we must have the co-operation of the teacher and superintendent of public and private schools, and even kindergartens. If I had my way, I would have all the school children provided with a little leaflet of instructions, which would read about as follows:

Do not spit, except in a spittoon or a piece of cloth or a hand-
used for that purpose alone. On your return home have
by your mother, or the handkerchief put in water
wash.
ate, floor, sidewalk, or playground.
ers into your mouth.

Do not pick your nose or wipe it on your hand or sleeve.

Do not wet your fingers in your mouth when turning the leaves of books.

Do not put pencils into your mouth or wet them with your lips.

Do not hold money in your mouth.

Do not put pins in your mouth.

Do not put anything into your mouth except food or drink.

Do not swap apple cores, candy, chewing-gum, half-eaten food, whistles, bean-blowers, or anything that is put in the mouth.

Peel or wash your fruit before eating it.

Never cough or sneeze in a person's face. Turn your face to one side and hold a handkerchief before your mouth.

Keep your face and hands and finger-nails clean; wash your hands with soap and water before each meal.

When you don't feel well, have cut yourself, or have been hurt by others, do not be afraid to report to the teacher.

In schools where slate or lead pencils are given to the children and collected after school hours, these articles should be disinfected before they are again distributed to the pupils. Not only the spread of tuberculosis, but far more contagious diseases, such as measles, diphtheria and scarlet fever, may be prevented among school children by this simple precaution. The custom in vogue in some schools to have every child use a suitable envelope, so as always to have the same pencil, while preferable to no precaution at all, is, in my opinion, not nearly as safe as a thorough disinfection.

I have said that consumption is not hereditary, and children born of consumptive but intelligent and conscientious parents need not necessarily contract the disease. I myself have seen children of a consumptive parent grow up to be strong men and women, but their parents were not only careful, clean and conscientious; they were also aware that, while they did not transmit consumption to their children, they did transmit to them a tendency or predisposition to this disease. This hereditary predisposition is, however, a condition which can be overcome by judicious training, proper food, plenty of outdoor exercises, and the avoidance of all excesses. Predisposed individuals should dress sensibly and according to the season. Never should they wear garme
restrict circulation or hinder the free physiologica
chest or abdomen. Tightly-laced corsets, tig
shoes, are all pernicious and particularly da
vidual predisposed to tuberculosis.

A predisposition, whether inherited or acquired, may be explained as a peculiar weakened state of the system which offers a favorable soil for the growth and multiplication of the germs of consumption. I have already said what should be the duty of the parents if they are themselves consumptive and fear to have transmitted to their offsprings a predisposition to the disease.

Concerning alcoholism and other intemperate habits, which are so often the forerunners of consumption, I desire to speak plainly. I do not wish to appear to you as a temperance lecturer, condemning all and everything which does not subscribe to the doctrines of the temperance party. I consider alcohol a medicine, at times indispensable in the treatment of certain diseases; but liquor as a beverage is never useful and nearly always harmful. Alcoholism must be considered the greatest enemy of the welfare of a nation, the most frequent destroyer of family happiness, the cause of the ruin of mind, body and soul, and certainly the most active co-operator of the deadly tubercle bacillus.

To combat alcoholism (drunkenness or intemperance) education, above all, is required. Extreme prosecution and fanatical laws will do little good. From early childhood the dangers of intemperance and its fearful consequences should be taught. In schools and at home the drunkard should be pictured as the most unhappy of all mortals. While the very moderate use of feeble alcoholic drinks, such as light beers, may be considered as harmless to adults when taken with their meals, alcohol should never be given to children, even in the smallest quantities.

In families in which there is a fear of hereditary transmission of the desire for strong drink, even the mildest alcoholic drinks should be absolutely avoided. It would also be best if all people so predisposed, or who may have acquired only the occasional desire for drink, would never smoke, for experience has taught that attacks of dipsomania (periodical sprees) are often caused by an excessive use of tobacco. The young man starting out in life should take with him the moral training which will enable him to be a gentleman, and be considered a polite gentleman, though he absolutely refuses ever to enter a liquor saloon in order to treat or be treated to drink. It is this treating habit—alas! so prevalent in our American society—which has ruined many a young man and made him a moral and physical wreck. The creation of tea and coffee houses, where warm, non-alcoholic drinks, including bouillon, are sold in winter and cool ones in summer, are to be encouraged. It would be of additional advantage if some of these

houses could also offer healthful amusements for old and young. Temperance societies, which, through tactful and intelligent propaganda, help to combat the fearful evil of alcoholism, should receive encouragement from everybody.

There is another point in regard to alcohol and tuberculosis I wish to emphasize, and that is the idea that alcohol is a remedy, or even a specific remedy, for consumption. There has never been a greater mistake made. Alcohol has never cured and never will cure tuberculosis. It will either prevent or retard recovery. It is like a two-edged weapon—on one side it poisons the system, and, on the other side, it ruins the stomach and thus prevents this organ from properly digesting the necessary food. Truly pathetic are the results of this erroneous doctrine in the families of the poor, where, instead of procuring good nourishment for the invalid, liquor has been bought in far too large quantities, so that often there was not enough money left for food for the sufferer nor for the other members of the family.

The individual enfeebled by disease, such as typhoid fever, grippe, etc., should lead a particularly careful life, and avoid crowded meeting places and all localities where the air is vitiated and where he is in danger of coming in contact with careless or ignorant individuals who expectorate everywhere. The man who has a trade, such as the printer, tailor, book-keeper, or other workers whose occupations are more or less predisposing to tuberculosis, can render their work relatively healthful by leading a sober life and, when not at work, spending as much time as possible in the open air, by breathing deeply, and keeping the body in a thoroughly good condition through regular bathing and judicious exercise.

I believe I have now said all I could, in the brief space of time allotted to me, of the duties of the consumptive, of those living with him, of those who are in fear of becoming consumptive, and of the parents who may have transmitted to their children a predisposition to the disease. The duty of the individual who is not included in these four classes is to make himself acquainted with the facts stated. Everyone, whether he is consumptive or lives with consumptives or has nothing whatsoever to do with consumptives, should know the few principal sources for the propagation of the disease and the means to combat them. It should be known to everyone that consumption is an infectious, communicable, preventable and curable disease, and that in the early stages the cure is often accomplished as many as seventy-five to eighty-five times

out of a hundred. What is most interesting to know is that this cure cannot only be accomplished in California or Colorado, but also in our own home climate—not, however, by quacks and patent medicines, but by the scientific and judicious use of fresh air, sunshine, water, abundant and good food (milk, eggs, meat, vegetables, fruit), and the help of certain medicinal substances when the just-mentioned hygienic and dietetic means do not suffice in themselves to combat the disease.

The thorough and constant supervision of the pulmonary invalid, the immediate intervention when new symptoms manifest themselves or old ones become aggravated or do not disappear rapidly enough, the prescribing of proper food and drink, can only be done by the thoroughly-trained physician either in the home of the patient or in a properly-conducted sanatorium.

On everyone with the knowledge of the prevention of consumption which he may have possessed already, or which I may have been fortunate enough to convey to him, I think it my duty to impress the fact that he can do something toward the combat of the disease.

If you are in the presence of a consumptive who is not yet under medical care, teach him what you know of the prevention of the disease and advise him to seek the counsel of a competent physician. If he is too poor to pay for a consultation and too proud to ask it for nothing, tell him to apply to the Health Department, which will send him one of its physicians without cost. No tuberculous invalid, no matter in what stage of the disease, whether living in a palace or in the poorest tenement house, should be without a medical adviser. If you meet a consumptive who is ignorant of the precautions he should take, do not shun him like a leper, but treat him with kindness and convince him that whatever he does to prevent the spread of the disease among others will also improve his own condition and increase the chances of his recovery.. Let me tell you that a clean, conscientious consumptive is as safe a person to associate with as anybody. If in your daily life you can influence others to make themselves familiar with the necessary knowledge of the prevention of tuberculosis, do so. If, through your influence, your words and example, you can combat this fearful curse of our nation—alcoholism—I beseech you do your duty.

Another subject which must be spoken of is a rather peculiar affliction in itself and concerns everybody. I refer to phthisiophobia, which means a morbid or exaggerated fear of the presence

of a consumptive. Alas! it has to come to a point where phthisiophobia is not confined to a few individuals, but where we must speak of official, private, and even professional phthisiophobia. Official phthisiophobia started in the United States about two years ago, when the surgeon-general of the Marine Hospital Service issued a declaration that pulmonary tuberculosis must be classed as a dangerous contagious disease, and that in future immigrants or aliens visiting our shores afflicted with pulmonary tuberculosis must be debarred from all ports of the United States. In June of last year an order was issued confirming the above decision, and adding that tuberculous individuals should be debarred regardless of boards of special inquiry, which heretofore had used their discretion in the matter.

It goes without saying that none of us desires pauper immigration, and we do not want any such class to enter our country, whether they are tuberculous or not. The question here is simply, is it right, just and scientific to declare pulmonary tuberculosis a dangerous contagious disease, and exclude on that account worthy immigrants who offer a guarantee that they will not become a burden to the community, or to exclude aliens and visitors afflicted with pulmonary tuberculosis?

To show you the spirit with which the bulk of the American medical profession protested against this action on the part of the Federal Government permit me to copy here the resolutions which were passed by the New York Academy of Medicine on February 6, 1902:

WHEREAS, The Treasury Department of the United States, upon recommendation of the surgeon-general of the Marine Hospital Service, has recently decided to classify pulmonary tuberculosis with dangerous contagious diseases, be it

Resolved, That the New York Academy of Medicine deeply deplores this decision, which is not based on either clinical experience or on scientific experiments. Be it further

Resolved, That the academy considers the exclusion of non-pauper tuberculous immigrants and consumptive aliens visiting our shores unwise, inhumane and contrary to the dictates of justice. Be it further

Resolved, That while the academy is convinced of the communicability of tuberculosis and urges all possible precautions against the spread of the disease occasioned by sputum and tuberculous food, the academy is opposed to all measures by which needless hardship is imposed upon the consumptive individual, his family, and his physician.

The Goodsell-Bedell law of the State of New York, which makes it practically prohibitive to establish a sanatorium for consumptives anywhere in that State, is an example of State phthisiophobia. If any board of supervisors of a county, or a town board, should be opposed to the establishment of a sanatorium for consumptives in their vicinity, the mere adoption of resolutions would suffice to make the creation of such an institution impossible. Heretofore the State Board of Health alone decided such matters.

The attempts of some Colorado and California statesmen to exclude consumptives from entering their respective States is another feature of State phthisiophobia. That we have occasionally even some phthisiophobia in the profession I am obliged to admit, though I do it with a heavy heart. Thank God, this professional phthisiophobia is very rare, and as I believe to have shown in my recent article, entitled, "A Plea for Justice to the Consumptive," even if there is now and then a case of professional phthisiophobia, I am proud to say we have in our ranks thousands of the most devoted friends of the consumptives.

Private phthisiophobia has resulted partially from the Federal and State phthisiophobia just discussed, and partially from the excessive caution of those who are not sufficiently educated in the matter. Let me give you a few instances of the form it takes. Poor sewing women have been discharged, not because they were consumptive themselves, but because they were imprudent enough to mention in the presence of their employers that they were living with or related to some consumptive. Employees in offices having an innocent cough are discharged for fear of contagion.

To show you how absurd all this fear is, how utterly wrong and inhumane it is to classify a disease like pulmonary tuberculosis with as dangerous a disease as smallpox, permit me to use the following illustration: If a consumptive is clean and conscientious with his expectoration, you may shake hands with him, sit next to him and associate with him for hours and days, and you will never contract the disease from him. Sit next to a smallpox patient, shake hands with him, and associate with him for half an hour, and unless you are vaccinated and revaccinated you run the risk of contracting smallpox.

A well-conducted and well-equipped sanatorium for consumptives is the safest place where not to contract the disease. A smallpox hospital, no matter how well kept, no matter how hygienically constructed, is always dangerous to enter unless you are vaccinated and revaccinated.

So as not to convey to the public the idea that the mere contact of a consumptive suffices to transmit the disease, I prefer to call consumption a communicable disease, and not by any means a dangerous contagious one. Let us all be true, kind and helpful friends to the consumptive, particularly where he is conscientious, and let us not forget that consumption is a disease of every country and every clime, of the rich and of the poor, of the high and the low, and that we can never tell when it may strike our own household or circle of friends.

Some individuals have, by virtue of their calling, a special duty to perform in the combat of tuberculosis. The most important of those is, of course, the physician, "the well-trained physician," as I say in my title. In order to train good physicians we must have good schools. In order to have good medical schools they must not depend for their existence on the number of students paying tuition fees, and thus reducing the standard of requirements. In other words, our medical schools should be State institutions and be supported by the State, and the United States Government alone should be permitted to grant licenses to practice medicine. A Federal commission of medical examiners could meet once a year in every State of the Union to examine candidates. Then the American people throughout this country would know that only duly qualified practitioners could be their medical counselors.

Every family should have a family physician, for to my mind it is the family physician, and not the specialist, who has to do the bulk of the work which lies before us. It is to him that I look as the most important factor in the possible eradication of tuberculosis as a disease of the masses. But the families under his charge should remunerate his services for the prevention of disease as liberally as when he is called to treat an occasional sickness.

Phthisiogenetic diseases—that is to say, those that are apt to be the forerunners of pulmonary tuberculosis, as, for example, scarlatina, measles, or grippe—are all diseases which the earlier they are discovered the more chance there is of their taking a favorable course. The family physician on his regular visits, whether anybody is ill or not, may discover the early symptoms of these diseases before the sufferer himself has any idea of being a patient. What great good cannot the family physician accomplish by a regular periodic examination of the chest of every member of the family entrusted to his care? How many more early cases of consumption could thus be discovered, and by timely and judicious care be cured, than we are curing now? Again, it is the family

physician, friend and adviser, who may exert the most beneficent influence on old and young by pointing out to them the danger of excesses of any kind, and particularly intemperance; for let us repeat that alcoholism is not only one of the most important phthisiogenetic diseases, but, let me add, also the cause of a number of the most serious nervous and mental disorders, leading, alas, too often to crime and moral degeneration of whole families. In some European sanatoria for tuberculous and scrofulous children statistics show that more than 25 per cent. of the little inmates are of alcoholic parentage.

In order that the high mission of the family physician should be truly effectual in the eradication of the disease in question and the improvement of the human race in general, not only the rich and well-to-do, but also the poor and poorest, should be provided with a regular medical attendant, who should be in the service of the municipality.

Of the duties of the teachers I have already spoken in relation to the prevention of tuberculosis during childhood. I wish to add that to my mind the teachers in our public schools should not only be familiar with the ordinary methods of preventing the spread of the disease and preach and practice ample ventilation in their classrooms, but they should also be familiar with the general appearance of the tuberculous child, so that they may call the attention of the school physician or the parents to the condition of the pupil. It should be known that bone and joint tuberculosis is most frequently manifested in childhood. The early symptoms of tuberculosis of the bones and joints show themselves in the lameness and easy tiring of the arms or legs affected. If the spinal column is affected, the symptoms will depend upon the location of the vertebræ which is attacked by the disease. Scrofulosis, which is only a milder form of tuberculosis, and which is even more frequent than bone tuberculosis in children, is easily recognized. The scrofulous child is usually pale, with flabby skin and muscles. The glands around the neck are swollen, and skin disease, sore eyes, and running ears are frequent symptoms. The little patient usually manifests a phlegmatic condition, but we may also find that some are nervous and irritable. The latter often have a peculiarly white, delicate skin, which makes the veins visible. Fever may be observed in some children. In view of the happily very curable nature of scrofulous affections, the importance of the early recognition and of the timely and judicious treatment is, of course, self-evident.

This scrofulous condition may be either inherited or acquired. The hereditary type comes from parents who are scrofulous, tuberculous, or syphilitic. It has also been proved that when one or both of the parents were alcoholics—that is to say, addicted to the chronic use of intoxicants—their offspring have become scrofulous.

All this shows how dangerous it is for weakly and sickly persons or those afflicted with any of the above-mentioned diseases to marry and have children before being completely restored to health. We wish to state again that all these diseases can be cured by timely medical treatment. To be cured from alcoholism the physician's help is not always necessary. In most cases it requires only the earnest and honest endeavor to abstain.

The principals of schools should make it their duty to incorporate in the curriculum of all classes gymnastics, outdoor exercises and games. The mental development of our children, valuable as it is, should never be pushed to the detriment of their physical development and well-being.

Clergymen also should inculcate these ideas in the minds of the people under their charge, and they, too, should feel pride in having their churches hygienically constructed and well ventilated. Fixed carpets should not be used in places of worship, where so many people congregate. Catholic priests in charge of large congregations may do well to follow the example of the great Roman divine, the Bishop of Fano, in Italy. In a circular recently issued by him he asks the priests of his diocese to comply with the following rules: "1. In every church the floor must be regularly cleaned with sawdust, saturated with a strong sublimate solution. This thorough cleaning should take place particularly after holidays when great masses of people have visited the church. 2. Every week all ordinary chairs and confessional chairs must be thoroughly cleaned with moist rags. 3. The grate of the confessional chairs must be washed every week with lye and then polished."

It might be of advantage if such articles of adoration as crosses, statues, or, as in Greek churches, pictures, which are often kissed by devout Catholics, be included in the periodic disinfection. Kissing the Bible when taking an oath should be discouraged by divines and jurists.

Ministers of all denominations should consider it beneath their dignity to allow their names to be used to advertise patent medicines and other secret remedies. I am convinced that if they were

aware of the fact that many of the advertised patent remedies contain as much as 30 and 40 per cent. of alcohol and often other dangerous ingredients they would refrain from indorsing the use of medicines of whose composition they have not the least idea. Neither should religious newspapers lend their columns to the advertisement of nostrums and patented remedies of all sorts. It is to be regretted that patent medicines are also not infrequently recommended by statesmen and legislators. Their personal indorsement of this or that secret remedy, given without forethought and, perhaps, even with good intentions, has often done irreparable harm to sufferers.

Of the duties of the public press in this fight against the "great white plague," the most formidable disease of the masses, I cannot speak earnestly enough. Our daily and weekly papers have already done much good in disseminating knowledge regarding the prevention of consumption. By continuing to spread the literature of the various associations and committees on the prevention of tuberculosis they do, perhaps, more than any other agent.

Unfortunately, the public press serves also for the advertising of the many "absolutely sure consumptive cures" which are from time to time put on the market by unscrupulous quacks. I am nevertheless sanguine enough to hope that in time the better class of newspapers will, in the interest of the community at large, no longer extend the hospitality of their columns to such dangerous advertising matter, especially when it is protested against by the intelligent reader. How many poor consumptives have lost their last little reserve fund by giving everything they had for a dozen bottles of the "sure and quick cure," only those who come much in contact with them know. How unscrupulous some of these charlatans are in their method of procuring certificates of cure, which they then publish as bait to the unfortunate help-seeking sufferer, is something which can hardly be believed. Let me tell you of one instance. A poor woman in the last stages of consumption came to me seeking advice. When asked for the name of her former medical attendant she confessed that she had been treated for a number of weeks by a quack concern, and now, her means being exhausted, she was made to understand that they would not continue to treat her unless she would give them a certified testimonial that she had been thoroughly cured of her disease, which had been pronounced an advanced case of consumption by prominent physicians. This poor sufferer had not derived any benefit whatsoever from the treatment, and as a result

her conscience would not permit her to become a partner to such a procedure.

Some of these unscrupulous concerns resort to absolute fraud. To beguile the public they used the name of the great scientist and benefactor, Prof. Robert Koch, of Berlin, as though he were associated with them in their business and treatment. They advertise his picture beside that of an individual with a similar name, and head their advertisements with "Professor Robert Koch's cure." While the medical profession at large was, of course, aware of this evident fraud, the public did not seem to be, and in order to be able officially to deny any such connection I wrote some time ago to Prof. Robert Koch, of Berlin, Germany. The professor's answer was a lengthy one and full of indignation, and I will only give you the substance of it. He says that the alleged "lung cure" of Dr. Edward Koch, or under whatever name this system of treatment may be presented to the American public, is a very base fraud, and that he, Geheimrath Professor Dr. Robert Koch, has no relations whatever with Dr. Edward Koch, with any other individual who may be connected with this concern, nor with any of its methods of treatment; neither has he ever had any relations with the same. He hopes that we may be successful in putting an end to this base and fraudulent concern. This is to be particularly desired in the interest of the many poor consumptives who have been deceived by the use of his (Prof. Robert Koch's) name in connection with the so-called Koch's Consumption and Asthma Cure.

There are numerous other concerns which put their secret consumption remedies on the market and resort to all sorts of illegitimate means to make people believe that their "cures" are indorsed by the profession.

To break the nefarious trade of the men who deal in "sure and infallible" consumption remedies, to stop the practice of the men and women who claim to be able to diagnose and treat consumption by letter, the Christian Scientists, the Faith Curists, who ridicule preventive measures and the laws of cleanliness and hygiene —which are the laws of God—but who, as a token of faith, demand their fees in advance, we have but one weapon, and that is education—education by the conscientious press, the clergyman and the teacher.

Factories, workshops, stores, offices, etc., should be sanitarily constructed and well ventilated, but besides this there are other things which the employer can do in the combat of tuberculosis.

In factories, workshops, stores, offices, etc., there should always be a sufficient number of spittoons, preferably elevated and of unbreakable material. Wherever such precautions are taken and some conspicuous signs forbidding expectorating on the floor put up, if necessary, making it punishable by law, promiscuous spitting will soon cease, and an important point in the combat of tuberculosis will be gained.

All employees, men and women of whatever class, should be allowed ample and regular time for their meals, which should never be taken in the workshops. Lastly, employees should not be overworked. There should be reasonable hours for all, so that the laborer may enjoy the bodily and mental rest which is essential to the preservation of health. The germs of any disease, but particularly those of tuberculosis, will always find a more congenial soil for development in an overworked and enfeebled system. Child labor—that is to say, the employment of children under fourteen years of age—in factories, workshops, mines, etc., should be prohibited by law. The child is more susceptible to tuberculosis than the adult, especially when its delicate growing organism is subject to continued physical strain. That there are still sections in our country where child labor is permitted is one of the saddest and most disgraceful blots upon the good name of our nation.

It is hardly fair to speak of the duty of the rich as philanthropists, for philanthropy is a voluntary act, and the rich man cannot be compelled to give some of his wealth to his less fortunate fellow-men. Still less have we a right to dictate to a millionaire how to dispose of his wealth when he is philanthropically inclined. This country has nevertheless a right to be proud of many of its rich men and women, and I am the last to underestimate the fortunes which have been given to the various educational and religious institutions by our Carnegies, Rockefellers, Vanderbilts, Morgans, Piersons, Schiffs, our Helen Goulds, Phœbe Hearsts, Emmons Blaines, etc., but it is natural that those of us familiar with the needs of the consumptive poor in this country should look for help in solving this difficult tuberculosis problem to the large-hearted American men and women who make such noble use of their wealth. There are now, perhaps, plenty of libraries and colleges,, and even general hospitals, everywhere, but there is a scarcity of public baths, which should, at a moderate price, be at the disposal of the people every day, winter and summer, and for some hours in the evening. There is a scarcity of decently-kept places of amusement, open all the year, where the laborer

and his family may spend a pleasant Sunday afternoon and partake of non-alcoholic drinks. There is a scarcity of hospital and sanatorium facilities for thousands of poor consumptives who could be cured if only taken care of in time. Sanitoria for consumptive adults, as well as seaside sanitoria for scrofulous and tuberculous children, are a crying and urgent need for the majority of our large American cities. The more consumptives we cure the more breadwinners we create and the fewer people will become burdens to the community. As the conditions are now in most of our cities and towns the majority of consumptives are doomed to a certain and lingering death, and if they are careless or ignorant of the necessary precautions, they will infect some of their own kin and neighbors.

Would that I could take some of our philanthropic friends to our densely crowded tenement districts and show them there the sufferings of mind and body of the poor consumptive who had to die, not because his disease was incurable, but because there was no place to cure it. I am convinced that if our generous and wealthy fellow-citizens would but see for themselves these conditions, instead of more libraries, universities and colleges, we would soon have better tenements, more playgrounds and parks for children, and an abundance of sanitoria and hospitals for our consumptive poor.

Our country has recently been blessed with some particularly large gifts for the purpose of research in scientific medicine. I am the last to underestimate scientific research, but what I would like to see is that a few of the millions now put aside by some of our generous fellow-citizens for that purpose should be utilized to demonstrate practically and on a large scale what laboratory and clinical research work concerning the prevention and cure of tuberculosis has already taught us. Experiments by that careful observer, who is as great a scientist and physician as he is a humanitarian, our esteemed colleague, Dr. Trudeau, and the experiments by many others have demonstrated that animals deprived of light and good air succumb to an inoculation of tuberculosis much more rapidly than animals injected with the same amount of tuberculous matter, but which are left to roam about in the sunshine and fresh air.

Why do our philanthropists not utilize the results of these experiments and build model tenement houses where air and light is plentiful for all who live in them? Why don't our municipalities benefit by these laboratory experiments, which are corrobo-

rated by clinical work in all our hospitals, and see to it that overcrowding, the existence of dark bedrooms and dark hallways, the accumulation of filth and odor, is made impossible by the greedy landlords of our tenements?

I think the time has come when all municipalities should build, own, and manage model tenement houses for its honest laboring population. That this can be done with great sanitary, moral, and even financial gain has been amply demonstrated by the experiments of the city of Glasgow. Let some of the millions set aside for laboratory research work be now consecrated to research in the direction of cure. Let us have enough hospitals and homes for the hopeless consumptive poor, who constitute a menace to their fellow-men, owing to their poverty and general unhygienic environments. Let us have sanitoria for the curable, and a sufficient number of them. Let us have agricultural and horticultural colonies for the cured, and let us turn our search, or research, if you like the word better, in the direction of seeing how many lives we may thus be able to save.

Let me conclude by summarizing what, to my mind, should be the duty of municipal, State and Federal governments. Each community should have an efficient committee on tuberculosis, composed of a number of general practitioners, health officers and trained charity workers. This commission should have its offices in a building connected with a special dispensary for tuberculous patients, if the size of the community demands such a provision. Each case applying should be carefully examined for the following purposes:

1. To determine the applicant's condition by medical examination.

2. To visit his home if he has been found tuberculous, and to institute such hygienic measures as seem necessary (distribution of pocket spittoons, disinfectants, etc., gratuitously if the patient is poor).

3. To examine the other members of the family in order to find out if any of them have also contracted the disease, and if so, to counsel proper treatment.

4. To report in full to the sanitary authorities concerning the condition of the patient's dwelling. Its renovation or even destruction may be imperative when it is evident that tuberculosis has become "endemic" there, owing to the condition of the soil or other sanitary defects.

5. To determine the financial condition, whether the patient is

or is not able to pay, and whether or not by his being taken to an institution the family will become destitute.

If the latter should be the case, it would be necessary for the municipality to provide for the family. In many cases a letter of inquiry sent to the former medical attendant of the patient would materially aid in the work of the investigating committee.

Any individual should have the right to present himself for examination, and every physician should be at liberty to recommend any person for examination to the board of his precinct or district.

Every city should, of course, have an efficient health department, a building department, tenement-house commission, street-cleaning department, and a board of education, all of them combining to render the city as sanitary as possible, and thus combating centers of contagion of tuberculosis and other diseases, keeping the streets as free from dust, filth and smoke as possible, preventing the construction of unsanitary, unsafe dwellings, and the overcrowding in homes, sweatshops and factories, and making of the public schools, where our children dwell so many hours, models of perfect ventilation and places for true intellectual and physical development, thus furthering the physical and moral welfare of the entire community.

Our State legislators should do their utmost to enact such laws as will secure always proper ventilation and light in public and private buildings.

Another feature in the combat of consumption which, to my mind, has been somewhat neglected is the prevention of tuberculosis among animals; for notwithstanding Professor Koch's recent declaration at the Tuberculosis Congress in London, there is still too much evidence of the possibility of the transmission of tuberculosis from the bovine to the human race.

State boards of health should receive ample appropriation to combat tuberculosis among men and animals, and be helpful in creating State sanitoria and agricultural colonies for consumptive adults and seaside sanitoria for scrofulous and tuberculous children; also special hospitals and tuberculosis dispensaries, and lastly, the United States Government should, after the example of Great Britain, France and Germany, not only have a ministry of public health, but also a special commission, appointed by the President of the United States, composed of expert sanitarians, physicians and veterinarians, who should unite with the State and municipal sanitary authorities of the country in the combat of tuberculosis in all its forms among man and beast.

You may think some of my suggestions too radical or too difficult to be realized. Yet, I venture to say, that would only one-tenth of the 150,000 American citizens who now annually die of this preventable and very largely curable disease be in danger of succumbing to an acute contagious disease, like smallpox, yellow fever, or plague, the whole nation would be up in arms, Federal, State and municipal legislative bodies would vie with the philanthropist to stamp out the disease. Yet the mortality from tuberculosis is only so great because the disease is not sufficiently prevented and there are not enough places to cure it, and it could be reduced to a minimum by proper methods of prevention and cure. Again, the economic loss of 15,000 American citizens from smallpox, yellow fever, or plague, all of which are acute infectious diseases, does not compare with the economic loss caused by the death of 150,000 of citizens, mostly between the age of fifteen to thirty-five, who must now annually die from tuberculosis, which is a chronic, infectious disease. Add to this great economic loss from tuberculosis the tears and sorrows of millions, why shall I not hope that the American conscience will at last awaken in statesman, city father, and philanthropist, and in all loyal citizens in a position to help toward the eradication of pulmonary tuberculosis, a disease so eminently preventable and so often curable?

16 West Ninety-fifth street.

ACTS RELATING TO TUBERCULOSIS PASSED BY THE LEGISLATURE, SESSION 1904

PART V

Acts Relating to Tuberculosis Passed by the Legislature

SESSION 1904

The Honorable Tuberculosis Commission,
Dr. William S. Thayer, President.

SIR: In accordance with your instructions I present herewith an account of legislation presented to the late legislature and passed by them at the recent session. This included the draft of an act creating a new commission as recommended by the Honorable Commission in its preliminary report. This law was drafted after the copy of the law creating the Commission of 1902 and contained the same provisions with the exception that a special investigation of the question of a State sanatorium was ordered and that an appropriation of four thousand dollars, which, by good fortune, has proved just sufficient for fifteen months' work of the Commission of 1902 was reduced one half to serve the needs of the Commission of 1904.

Two special bills were presented and passed having important bearing on the subject of tuberculosis in Maryland.

Senate Bill No. 134 (Chap. 412 Acts of 1904) entitled "an act to add certain sections to Article 43 of the Code of Public General Laws, title, Health; sub-title, Infectious Diseases, to follow Section 34F and to be known as Sections 34G, 34H, 34I, 34J and 34K."

Senate Bill No. 143 (Chap. 399 Acts of 1904) entitled "an act to protect citizens of Maryland from certain communicable diseases, especially tuberculosis of the lungs and larynx."

The former act relating to notification and disinfection was prepared by Dr. Fulton, secretary of the State Board of Health.

The second act was presented at an earlier date with a communication, a copy of which is submitted in view of its important bearing on the execution of the law.

Respectfully submitted,

MARSHALL LANGTON PRICE,
Medical Officer.

An act to add certain new sections to Article 43 of the Code of Public General Laws, title "Health," sub-title, "Infectious Diseases," to follow Section 34F and to be known as Sections 34G, 34H, 34I, 34J and 34K.

Section 1. Be it enacted by the General Assembly of Maryland that certain new sections be and the same are hereby added to Article 43 of the Code of Public General Laws, title "Health," sub-title, "Infectious Diseases," to follow Section 34F and to be known as Sections 34G, 34H, 34I, 34J, 34K and to read as follows:

Section 34G. Be it enacted by the General Assembly of Maryland that from and after the passage of this act the State Board of Health of Maryland shall keep a register of all persons in this State who are known to be affected with tuberculosis. The State Board of Health shall have sole and exclusive control of said register, and shall not permit inspection thereof nor disclose any of its personal particulars except to officials authorized under the laws of Maryland to receive such information.

Section 34H. The superintendent or other person in charge or control of any hospital dispensary, school, reformatory or other institution deriving the whole or any part of its support from the public funds of the State of Maryland or any city, town or county in the State of Maryland, having in charge or under care or custody any person or persons suffering with pulmonary or laryngeal tuberculosis shall within forty-eight hours after recognition of such disease make or cause to be made in the manner and form prescribed by the State Board of Health a record of the name, age, sex, color, occupation, social condition and residence of the person or persons so affected, together with such information as may seem necessary or important. And all such records shall be delivered under seal of the State Board of Health on Monday of the week immediately following that in which the records were made. Any superintendent or other person charged with a duty under this section who shall fail or refuse to comply with the requirements of this section shall be deemed guilty of a misdemeanor, and on conviction thereof shall be fined not more than twenty-five dollars.

Section 34I. Whenever any physician knows that any person under his professional care is affected with pulmonary or laryngeal tuberculosis he shall transmit to the secretary of the State Board of Health within seven days and upon blanks provided by the State

Board of Health for that purpose the name, age, sex, color, occupation, social condition and residence of such person and any physician failing or refusing to comply with the requirements of this section shall be deemed guilty of a misdemeanor and on conviction thereof shall be subject to a fine of ten dollars.

Section 34J. The apartments occupied by any consumptive shall be deemed infected and when vacated by the death or removal of said consumptive occupant shall be disinfected by the Board of Health of the city, town or county in which such apartments are situated. And it shall be the duty of the householder, physician or other person having knowledge of the facts to notify the local Board of Health within forty-eight hours after the death or removal of a person affected with pulmonary or laryngeal tuberculosis. And any person failing to comply with the provisions of this section shall be deemed guilty of a misdemeanor and on conviction thereof shall be subject to a fine of ten dollars.

34K. Any person who lets for hire or causes or permits anyone to occupy apartments previously occupied by a consumptive, before such apartments shall have been disinfected by a board of health shall be guilty of a misdemeanor and upon conviction thereof shall be fined twenty-five dollars.

Section 2. And be it enacted that this act shall take effect from the date of its passage.

Approved April 8, 1904.

LETTER OF TRANSMISSAL OF SPECIAL TUBERCULOSIS ACT.

The Honorable Tuberculosis Commission of Maryland,
Dr. William S. Thayer, President.

SIR: I have the honor to present for your consideration the draft of a law designed to prevent the spread of tuberculosis in the State of Maryland. The purpose of the law is to fill a field not now covered by the laws of the State or the ordinances or regulations of any city or town in Maryland.

The subject of general protection has already been sufficiently considered by your Honorable Commission following along the lines now laid down in a large number of States and cities in the United States.

The general protection afforded by State laws and local ordinances and regulations comprises mainly:

1. Notification of pulmonary and laryngeal tuberculosis and disinfection of the premises after death or removal.

2. Restriction of promiscuous spitting in public places.

3. Inspection of meat and milk and condemnation of all foods unfit for consumption.

The legal restriction of tuberculosis comprises two general headings:

(a) The limitation of the spread of tuberculosis by means of animal sources.

(b) The limitation of the spread of tuberculosis by means of human sources.

It is by the latter method that the disease is probably most frequently communicated to human beings and it is this method of propagation which is most difficult of control.

It has not appeared that the methods comprised in paragraphs 1 and 2 in use in various communities control the situation to any large degree. No method of control can be successful that does not take into account individual and domiciliary infection.

Measures of general public protection such as the control of promiscuous spitting in street cars and public places while of course of great value, do not reach the largest sources of dissemination of the disease. It cannot be claimed by any student of tuberculous infection that 3 per cent. of tuberculous persons have received their infections in street cars or public buildings.

While some conservatism must be maintained against the more extreme views, there seems good reason for according with the belief held by many of the most careful investigators that tuberculosis is essentially a house disease.

The repeated exposures apparently necessary to engraft a tuberculous infection would probably cause the liability of public infection to take a secondary importance. Of the infections of reasonably definite origin probably from 95 per cent. to 98 per cent. take place in the living rooms of those affected, while a further considerable percentage takes place in the work rooms.

It has appeared evident that a successful attack on tuberculosis in Maryland must be made largely through the homes of those affected. It has further appeared that while a general protection is afforded the public against tuberculous infection through the local anti-spitting ordinances none is afforded the individual exposed in his own home for a much longer period to a more dangerous and virulent infection. A careful study of the con-

ditions under which house infections occurred made it probable that individual protection in those instances could best be compassed by a special application of the general common law principles relating to nuisances in the manner described in Section 1 of the draft of the law herewith submitted. This section supplies an important need in affording protection to individuals who have the right to demand it when exposed to danger to life or health.

The precautions necessary in the households of consumptives have been left as far as possible with the physician attending the case and his duty is prescribed in a general way in Section 2 and more specifically in Section 3. To insure an efficient co-operation on the part of the physician he is required to return a report of the precautions which he has taken to the local board of health. As a necessary part of the control of the tuberculous case supplies are issued to the physician on requisition, the most important of which are paper sputum cups and paper napkins. The sum of one dollar and a half is provided, to be paid the physician as a proper remuneration for the measures of prophylaxis which he exercises.

The annual cost per patient is estimated at $2.50, one dollar and a half of which is paid to the physician, and the remainder for purchasing supplies, printed matter, etc. As there are about 2,000 new cases occurring annually in Maryland the annual expense would approximate $5,000.

The value of attacking the problem of tuberculosis simultaneously and in the same manner in the whole of the State of Maryland has been considered of vital importance in the framing of this act and accordingly the general problem of control has been left in the hands of the State Board of Health.

Respectfully submitted,

MARSHALL LANGTON PRICE,

Medical Officer.

ACTS—JANUARY SESSION, 1904—CHAPTER 399.

An act to protect citizens of Maryland from certain communicable diseases, especially tuberculosis of the lungs and larynx.

Section 1. Be it enacted by the General Assembly of Maryland that from and after the date of the passage of this act, any person affected with any disease whose virus or infecting agent

is contained in the sputum, saliva or other bodily secretion or excretion who shall so dispose of his sputum, saliva or other bodily secretion or excretion as to cause offense or danger to any person or persons occupying the same room or apartment, house or part of a house, shall on complaint of any person or persons subjected to such offense or danger be deemed guilty of a nuisance and any person subjected to such a nuisance may make complaint in person or writing to the Commissioner of Health of Baltimore city or the local health officer of any city, town or county in the State of Maryland where the nuisance complained of arises or exists and it shall be the duty of the Commissioner of Health or of any local health officer receiving such complaint to investigate and if it appears that the nuisance complained of is such as to cause offense or danger to any person occupying the same room, apartment, house or part of a house, he shall serve a notice upon the person so complained of reciting the alleged cause of offense or danger and requiring him to dispose of his sputum, saliva or other bodily secretion or excretion in such a manner as to remove all reasonable cause of offense or danger. And any person failing or refusing to comply with orders or regulations of the health commissioner of Baltimore city or of the health officer of any city, town or county requiring such nuisance to be abated shall be deemed guilty of a misdemeanor and on conviction thereof shall be fined ten dollars, provided that the requirements of this section shall apply only to pulmonary and laryngeal tuberculosis, pneumonia, influenza and such other diseases as the State Board of Health may from time to time determine to be communicable by means of sputum, saliva or other bodily secretion or excretion.

Section 2. It shall be the duty of the physician attending any case of pulmonary or laryngeal tuberculosis to provide for the safety of all individuals occupying the same house or apartment, and if no physician be attending such patient this duty shall devolve upon the local health board and all duties made incumbent upon the physician in the following sections shall be performed by the local board of health in all cases of pulmonary or laryngeal tuberculosis not attended by a physician or when the physician is unwilling or unable to perform the duties specified.

Section 3. It shall be the duty of the local board of health to transmit to the physician reporting any case of pulmonary or laryngeal tuberculosis a printed report after the manner and form to be prepared and authorized by the State Board of Health naming such procedures and precautions as in the opinion of the

State Board of Health are necessary or desirable to be taken on the premises of the said tuberculous case, and it shall be the duty of the State Board of Health to print and keep on hand a sufficient number of such report blanks and to furnish the same in sufficient number to any local board of health upon due requisition of the latter. Upon receipt of the blank report the physician shall fill, sign and date the same and return to the local board of health without delay provided that if the attending physician is unwilling or unable to undertake the procedure and precautions specified he shall so state upon his report and the duties herein prescribed shall then devolve upon the local board of health. Upon receipt of this report the local board of health shall carefully examine the same and if satisfied that the said attending physician shall have taken all necessary and desirable precautions to insure the safety of all persons living in the house or apartments occupied by the consumptive and to insure the safety of the people of the State of Maryland the said local board of health shall issue an order on the State Board of Health in favor of the attending physician for the sum of one dollar and fifty cents ($1.50) to be paid by the State Board of Health out of a fund hereinafter provided. If the precautions taken by the attending physician are in the opinion of the local board of health, not such as will remove all reasonable danger or probability of danger to the persons occupying the said house or apartment the local board of health shall return to the attending physician the report blank with a letter specifying the additional precautions which they shall require him to take, and the said attending physician shall immediately take the additional precautions specified and shall record and return the same on the original report blank to the local board of health. It shall further be the duty of the local board of health to transmit to the physician reporting any case of pulmonary or laryngeal tuberculosis a printed requisition which shall be prepared by the State Board of Health and issued in sufficient number to any local board of health upon due requisition of the latter. Upon this requisition blank shall be named the materials kept on hand by the local board of health for the prevention of the spread of the disease, and it shall be the duty of the State Board of Health to purchase such supplies as it may deem necessary from the fund hereinafter provided and to supply them to any local board of health upon the requisition of the latter. Any physician may return a duly signed requisition to the local board of health for such of the specified materials and in such amount as he may deem necessary in pre-

venting the spread of the disease, and all local boards of health shall honor as far as possible a requisition signed by the attending physician in such case. It shall be the duty of every local board of health to transmit to every physician reporting any case of pulmonary or laryngeal tuberculosis or to the persons reported as suffering from this disease provided the latter have no attending physician, a circular of information prepared and printed by the State Board of Health and which shall be furnished in sufficient quantity to every local board of health on due requisition of the latter. This circular of information shall inform the consumptive of the best methods of cure of his disease and of the precautions necessary to avoid transmitting the disease to others.

Section 4. Any physician or person practising as a physician who shall fail to execute the duties prescribed by this act or who shall knowingly report as affected with pulmonary or laryngeal tuberculosis any person who is not so affected or who shall wilfully make any false statement concerning the name, age, color, sex, address or occupation of any person reported as affected with pulmonary or laryngeal tuberculosis or who shall certify falsely as to any of the precautions taken to prevent the spread of infection shall be deemed guilty of fraud and on conviction thereof shall be subject to a fine of one hundred dollars or to imprisonment not exceeding six months or to both fine and imprisonment in the discretion of the court.

Section 5. The State Board of Health shall prepare and keep on hand all the circulars, blanks and printed matter required by the preceding section and all additional printed matter necessary in executing the provisions of this act, and shall issue the same in sufficient quantity to the local boards of health upon due requisition of the latter, and the said State Board of Health shall further purchase and issue upon due requisition to the local boards of health the supplies required by the provisions of this act. For the purpose of defraying the expenses of printed matter and postage for recompensing physicians for measures of prophylaxis, and for purchasing and issuing the supplies necessary in carrying out the provisions of this act the sum of five thousand dollars ($5,000) annually or as much thereof as may be necessary is hereby appropriated, payable by the treasurer of the State upon warrant of the comptroller at such times and in such sums as may be authorized by the State Board of Health upon presentation of the proper voucher.

Section 6. And be it enacted that this act shall take effect from the date of its passage.

Approved April 8, 1904.

ACTS—JANUARY SESSION, 1904—CHAPTER 476.

An act for the creation of a Tuberculosis Commission.

Section 1. Be it enacted by the General Assembly of Maryland that the Governor of the State be and is hereby authorized to appoint five persons, three of whom shall be physicians, who by virtue of such appointment shall constitute a commission to be known as the Tuberculosis Commission, whose duty it shall be to investigate the prevalence, distribution and cause of human tuberculosis in the State of Maryland to determine its relations to the public health and welfare, and to devise ways and means for restricting and controlling said disease, and to investigate and report upon the proper construction, cost, equipment, maintenance and location of a sanatorium for the treatment of tuberculosis.

Section 2. The members of said Commission shall serve without pay, except expenses actually incurred, and shall continue in office for a term of two years from the date of their appointment. They shall meet in the city of Baltimore within thirty days after the date of their appointment and thereafter as frequently as may be necessary; they shall fill by a majority vote any vacancy that may occur in their membership, and shall report the results of their investigations not later than January, 1906.

Section 3. All hospitals, dispensaries and other institutions having medical officers and supported in whole or in part by public funds of the State of Maryland or of any city or county in the State, shall cause to be made upon blanks furnished by the Tuberculosis Commission, records of such facts as may be available for the use and purposes of said Commission, concerning every case of tuberculosis coming under the care of such institution, and shall return such records at such times and in such manner as shall be directed by the Tuberculosis Commission.

Section 4. For the purpose of defraying necessary expenses, including printing, rent, postage and clerical assistance, the sum of two thousand dollars or so much thereof as may be necessary, is hereby appropriated, to be paid by the treasurer of the State upon warrant of the comptroller, at such times and in such sums as may be authorized by the Commission.

Section 5. And be it enacted that this act shall take effect from the date of its passage.

Approved April 12, 1904.

ADDENDA.

HISTORY OF THE TUBERCULOSIS MOVEMENT IN MARYLAND.

The first official recognition of the problem of tuberculosis in the State of Maryland is contained in a letter addressed to His Excellency John Walter Smith, of Maryland, by the Secretary of the State Board of Health, dated November 5th, 1901. In this letter Dr. Fulton pointed out the work being done in other States and cities in investigation of tuberculosis, and a necessity of careful investigation of the conditions existing in the State before trying any active measures of relief, and he recommended for this purpose appointment of the Tuberculosis Commission.

In connection with the death returns for the year 1901, Dr. Welch, President of the State Board of Health, again called the attention of the Governor to the high mortality due to tuberculosis and the excessive annual loss suffered by the State by reason of the loss of many lives and the disability and dependency of many of the citizens of Maryland dependent thereon (December 24, 1901).

On December 11th, 1902, at a meeting of the State Board of Health the Secretary was instructed to interview Governor Smith and to present to him the recommendations of the Board in regard to special legislation on tuberculosis, particularly urging the need of State sanatoria for the treatment of consumptives and the appointment of a Commission to study the problem of tuberculosis in Maryland, and to devise means for its restriction and control.

This proposition was favorably received by His Excellency, and a bill providing for the appointment of a Tuberculosis Commission was submitted to the Legislature, passed by them, and received Executive approval April 8th, 1902. The provisions of this law appear on the following page.

CHAPTER 451, PAGE 667, ACTS OF LEGISLATURE, 1902.

AN ACT for the creation of a Tuberculosis Commission.

SECTION 1. *Be it enacted by the General Assembly of Maryland,* that the Governor of the State be, and is hereby authorized to appoint a Commission, to be known as the "Tuberculosis Commission," to consist of five persons, three of whom shall be physicians, whose duty it shall be to investigate the prevalence, distribution and causes of human tuberculosis in the State of Maryland, to determine its relations to the public health and welfare, and to devise ways and means for restricting and controlling said disease.

SECTION 2. The members of said Commission shall serve without pay, except expenses actually incurred, and shall continue in office for a term of two years from the date of their appointment. They shall meet in the city of Baltimore within thirty days after their appointment, and thereafter as frequently as may be necessary; they shall fill by a majority vote any vacancy that may occur in their membership, and shall report the results of their investigations not later than January 1st, 1904.

SECTION 3. All hospitals, dispensaries and other institutions having medical officers, and supported in whole or in part by the public funds of the State of Maryland, or of any city or county in this State, shall cause to be made upon blanks furnished by the Tuberculosis Commission records of such facts as may be available, for the use and purposes of said Commission, concerning every case of tuberculosis coming under the care of such institutions. The records so obtained shall be and remain the property of the institution where they are made; provided only, that said Tuberculosis shall have free access to and use of such records during the period for which this Act shall remain operative.

SECTION 4. For the purpose of defraying necessary expenses, including printing, rent, postage and clerical assistance, the sum of four thousand dollars, or so much thereof as may be necessary, is hereby appropriated, to be paid by the Treasurer of the State, upon warrant of the Comptroller, at such times and in such sums as may be authorized by the Commission.

SECTION 5. *And be it enacted,* that this Act shall take effect from the date of its passage.

Approved April 8th, 1902.

REMARKS OF HIS EXCELLENCY EDWIN WARFIELD, GOVERNOR OF MARYLAND A. D. 1904-1908, AT THE OPENING OF THE TUBERCULOSIS EXPOSITION, JANUARY 25, 1904.

"I had had no idea that tuberculosis existed to such an alarming extent, especially in Maryland, where there are said to be over 10,000 cases, and where there were last year over 2,500 deaths from this dreaded disease, more deaths than from smallpox, diphtheria, measles, typhus, typhoid and yellow fever, cholera, leprosy and whooping cough combined.

"A grave duty devolves upon the State—the duty of coping with this scourge and preventing its spread. The proper treatment of this disease confronts us as a social problem, and it is gratifying to know that the medical and health boards of the State and city are uniting with public-spirited physicians, scientists and humanitarians in arousing the public to its duty in the premises.

"No one will question that the interest of our people demands that tuberculosis should, as far as possible, be stamped out by the establishment and maintenance of proper sanatoria for the treatment of early cases of the disease and the care of advanced cases, thus saving the lives of many and promoting the welfare of the State and community at large. Maryland is expending annually many thousands of dollars in aid of hospitals for the treatment of specified diseases, but no appropriation has been made for the suppression and reduction of this disease. We have no sanatoria in the State, no place except poorhouses and city hospitals to which a case of advanced consumption can go for treatment or care, be the patient rich or poor. Should such a condition exist in a country like this, and in a State like Maryland?

"This exposition is the clinical, supplementary report of the commission. Its purpose is to instruct the general public as to the characteristics of tuberculosis, and the simple and necessary hygienic measures which should be adopted to prevent its spread and to lead to its cure. I believe that it will result in arousing a deep interest on the part of the people in a humanitarian work and lead to a demand for proper legislation. I am in full accord and sympathy with what you are doing, and will very gladly cooperate in bringing about the measures you propose. This is the first time that I have appeared at a public function in my official capacity as Governor, and I am pleased that this first appearance is in the cause of humanity. I wish you every success and Godspeed in your work. I hereby declare this Exposition formally opened."

EXECUTIVE REFERENCES TO THE TUBERCULOSIS COMMISSION IN THE BIENNIAL MESSAGES OF HIS EXCELLENCY JOHN WALTER SMITH, GOVERNOR OF MARYLAND, 1900-1904.

MESSAGE OF JANUARY, 1902.

It is believed that much can be done by systematic scientific methods to prevent the spread of tuberculosis and effect its cure in the earlier stages.

When we consider that during the year 1900 two thousand and ninety-seven deaths in Maryland from tuberculosis were reported, which equal about 12 per cent. of the total number of deaths occurring in the State for the same period, and greatly exceeded the number of deaths attributed to any other disease, it is the evident duty of the State to adopt measures of relief. Eliminating all humanitarian considerations, and viewing the problem from a cold business and economic standpoint, without regard to the relief of suffering and freedom from misery, the fact that there are many unfortunate people who, by reason of this disease, are unable to contribute to the general welfare, and who, in most cases, must depend for treatment and sustenance on private benefactions, and in many cases on the public at various State and county institutions, which are not properly equipped for the purpose, is a restraint on the general material advancement of our people, and to that extent a detriment to the State.

If, by the exercise of proper regulations, the ravages of this disease can to an extent be checked and the productive energy of our people left to a greater degree unhampered by disease and the care of the infirm, the material advancement of the State will, to that extent, be promoted. There is scarcely a family in the State that has not had sad experience with this disease.

At present there are scarcely any provision made in this State for the reception and treatment in any institution of consumptives. A few find lodgment in hospitals, in spite of the rules intended to exclude them, and few are treated in the small hospital for consumptives in Baltimore County, but the majority are in the insane asylums, prisons, almshouses and private dwellings of the State, spreading infection to others, and with no hospital accommodations that can be had, no matter how much needed and desired.

I earnestly recommend for your favorable consideration the advisability of creating an unpaid commission to inquire into the presence of tuberculosis in the State, and to devise some means of dealing with it more economically and efficiently than at present. A sufficient sum should be appropriated to pay the expense incurred by said commission in making such investigation.

MESSAGE OF JANUARY, 1904.

One of the most pressing matters which demand your attention, one of surpassing importance to the people of the State, is the prevention and treatment of tuberculosis in all its forms, and especially pulmonary tuberculosis.

In this connection I wish to invite your notice to the exceedingly clear, painstaking and comprehensive report of Commission created by the General Assembly of 1902, Chapter 451, and appointed by me.

Information embodied in said report represents the fruits of much patient research, and I am fully persuaded the recommendations suggested by the Commission for restricting and controlling this dread disease are conservative and practical.

Careful estimates, based upon the best statistical information that can be had, placed the number of persons in Maryland suffering at present with tuberculosis at 10,000, a number about the same as the total population of Calvert County.

A small army of over 2,500 died of tuberculosis in Maryland in 1902.

The same consideration for the relief of the suffering endured by the unfortunate victims of this scourge of the human race, and the very substantial and tangible material benefit to arise by checking the ravages of the disease and preserving the health of the people, so that their energies shall not be sapped by suffering or diverted from bread-winning pursuits and monopolized in ministering to the sick, which influenced me two years ago to ask the General Assembly of 1902 to create the said Tuberculosis Commission to investigate the prevalence of the disease, its cause, and to devise means to restrain it, impels me now with equal earnestness to urge your honorable body to action.

In the face of scientific research it cannot be successfully denied that it is not only possible, but entirely practicable, to prevent the spread of the disease from one person to another, and in some

cases also to arrest its development in the individual upon whom it has seized.

No public facilities exist in Maryland for the treatment of tuberculosis, and we consequently lose every year many thousand dollars and many hundred lives.

The most powerful and the most pathetic illustration of the extent of the disease is the indifference of the public, born of long familiarity with its presence, to its frightful ravages. If 10,000 people in Maryland were inconvenienced today with a harmless epidemic we would be amazed and filled with consternation, but the presence of the same number of tuberculosis cases, most of them hopeless, occasions little comment. As a whole people, we take the untimely death from one disease of 2,500 of our citizens in a single year of hopeless, helpless fatalism.

If we could rid the subject of all the finer humanitarian considerations, and consider carefully from the baldest, coldest pecuniary standpoint, we would be forced to the conclusion that it is a paying business investment to grapple with this problem and solve it.

The loss in the productive capacity of the State by reason of the great number of people incapacitated by tuberculosis, and those whose time must be given to nursing the sick, must be enormously greater than the cost of caring for the sick in scientifically arranged institutions, in adopting simple precautionary measures.

INDEX


SCHOOL OF HYGIENE & TROPICAL MEDICINE
LIBRARY
1-SEP 194
LONDON